

Mr C. Fernandez,
Norwich Western Link Project Manager,
Infrastructure Delivery,
Community and Environmental Services,
Floor 2,
County Hall,
Martineau Lane,
Norwich, NR1 2DH.

26th February 2021

Dear Mr Fernandez,

Open letter to Norfolk County Council re barbastelle bat research findings and the proposed NDR 'Western Link' dual carriageway

As you are aware, research has been carried out for a number of years on a key population of a very rare and highly protected bat species, the Western Barbastelle (*Barbastella barbastellus*). This population is located to the north-west of Norwich. The research programme has been a collaboration between Wild Wings Ecology and the University of East Anglia, contributed to and supported by the Norfolk Barbastelle Study Group and a number of other professional ecologists, bat experts and researchers.

The selected route for the proposed 'Norwich Western Link' road (NWL) would pass through this nationally important area for barbastelles, which is home to the UK's only known 'super-colony' (the 'Wensum Valley Super-Colony'), which includes what is thought to be the UK's largest extant maternity roost.

Our data on the Wensum Valley barbastelle super-colony include roost locations, colony counts, home ranges, foraging areas, commuting routes and activity levels. Our Ecological Impact Assessment (EIA) of the road on barbastelles shows that the severity and diversity of impacts cannot be effectively mitigated or compensated for. Consequently, should the road scheme proceed, even with mitigation and compensation measures in place, it would be predicted to have a substantial negative impact on the super-colony and would be very likely to cause significant and sustained long-term damage to the Favourable Conservation Status of this nationally important bat population. Therefore, it is our judgment that the road scheme as proposed cannot be delivered in compliance with wildlife laws.

We feel that it is imperative that our research findings, which are considerably more comprehensive than the council's own barbastelle surveys for this area, are fully considered in relation to the road proposals. We are glad that the council is now willing to engage with our research findings, albeit at a rather late stage in the development of the road scheme proposals. Our research is ongoing and will be subject to peer-review prior to publication.

Therefore, to ensure you are aware of our data and findings thus far and can give these proper consideration in relation to the road proposals, we are providing an interim report here. In this letter I present a résumé of some of our (relevant) key research findings, more detailed information on barbastelle bats, our data collection, preliminary results and conclusions.

Key research findings

1. The proposed NWL would cut through a **nationally important area** for a rare, Annex II species: the barbastelle bat
2. This area is home to the **UK's only known 'super-colony' of barbastelles** (a cluster of significant, linked maternity colonies)
3. The 'Wensum Valley Super-Colony' includes what is thought to be the **UK's largest extant barbastelle roost**, with ≥ 105 individuals
4. The super-colony as a whole is estimated to have a **minimum of 270 barbastelles** (to put this in context, the criteria for 'Site of Special Scientific Interest' designation for barbastelles is breeding complexes of 20 or more adults)
5. To date we have located an exceptional **63 barbastelle roost trees within the impact zone of the proposed NWL**
6. The **main block of woodland to be directly cut through by the proposed road is home to a barbastelle maternity colony** (part of the super-colony)
7. The above key findings were missed by the council's own commissioned surveys for the road and as such impacts on barbastelles cannot have been appropriately assessed, with data inadequate for a valid assessment
8. There are also concerns given the failures of bat mitigation/compensation measures for the Norwich Northern Distributor Road (NDR) and the apparent disappearance of the two barbastelle colonies that were located within 2.5 km of the NDR, prior to construction
9. Our radio-tracking data show that **barbastelles avoid the bat mitigation road crossing structures on the NDR** (including the green bridge and bat gantries), instead crossing at potentially 'unsafe' locations, risking collision with vehicles
10. The projected scale and severity of the impacts of the road on this nationally important barbastelle population and the documented ineffectiveness of mitigation/compensation options are such that the **Favourable Conservation Status¹ of this barbastelle population could not be maintained should the road scheme proceed as proposed**

¹ "conservation status will be 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, and 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." - Habitats Directive Article 1 (i).

1. About barbastelles

1.1 Conservation status & legislation

Barbastelles are one of the rarest of the UK's 17 resident/breeding bat species. They are one of only two of our UK bat species to be listed as '*Near Threatened*' globally on the IUCN Red List, having undergone substantial population declines and extinctions in other parts of their range. In the Mammal Society's recently updated Red List of UK Mammals, barbastelles are described as being '*at imminent risk of extinction*' and listed as '*Vulnerable*'².

Barbastelles are protected by a range of legislation, including The Wildlife and Countryside Act 1981 (as amended) and are listed on Annex II of The Conservation of Habitats and Species Regulations 2017 (along with only three other UK bat species). It is an offence to deliberately or recklessly disturb, capture, possess, injure or kill bats or obstruct access to, damage or destroy their roosts. Disturbance includes '*to impair their ability to breed or reproduce or rear or nurture their young or to affect significantly the local distribution or abundance of the species*'. Annex II species are those whose conservation requires the designation of 'Special Areas of Conservation'.

1.2 Barbastelles in Norfolk – and the Norwich Northern Distributor Road

Norfolk is considered a stronghold for barbastelles and, thanks to the work of the Norfolk Barbastelle Study Group (Harris 2020³), we now understand a lot more about the species and the importance of Norfolk in ensuring the future persistence of this species.

Post-construction monitoring of the Norwich Northern Distributor Road (NDR) raised concerns over the road's impact on two (of three) main barbastelle colonies in the area, located c. 2.5 km and c. 350 m from the road. These colonies could not be located after the road had been completed and opened to traffic (Packman 2019⁴). In light of this and the location of the remaining/third significant colony in the area (furthest from the NDR, c. 3.5 km to the west), concerns over the likely impact of the proposed extension of the NDR through this area (the NWL) were highlighted. These concerns were removed from the monitoring report, without the author's consent, prior to publication on the council's website.

NDR post-construction bat monitoring data on the implemented mitigation/compensation measures for bats (including road crossing structures) showed that these measures had very low usage by bats and as such had likely failed to protect local bat populations. However,

² <https://www.mammal.org.uk/2020/07/one-quarter-of-native-mammals-now-at-risk-of-extinction-in-britain/>

³ Harris, J. (2020) A review of the barbastelle *Barbastella barbastellus* in Norfolk based on the work of the Norfolk Barbastelle Study Group. British Island Bats, Volume One, p33-49.

⁴ Packman, C.E. (2019) Norwich Northern Distributor Road post-construction barbastelle bat radio-tracking monitoring report, Year 1: 2018 (January 2019 v1.0 – correct/author-approved version). Wild Wings Ecology, Norwich.

this was not adequately analysed and conveyed in the associated reports published by the council.

1.3 Barbastelle ecology

1.3.1 Life history & food

Barbastelles can live to at least 20 years old and they reproduce very slowly (once mature, they typically give birth to one pup each year). They are ancient woodland specialists, requiring extensive tracts of good quality, mature natural habitats to survive and thrive. They feed on insects (with moths being a key component of their diet), including a number of arable crop pests, providing an 'ecosystem service' of natural pest control.

1.3.2 The role of woodlands: raising young, shelter & foraging

In the summer months, females congregate in 'maternity colonies', where they give birth to and raise their young, known as 'pups', in communal nursery roosts. Maternity colonies are usually found in mature woodlands, where they roost in trees, often under loose bark or other features that are associated with old trees. Each colony will utilise a number of individual roost features within the woodland, regularly moving between different roosts and as such require a significant number and range of available roosts within the maternity colony woodland. Barbastelles are considered to be sedentary and are highly faithful to their maternity sites, with females returning to the same woodlands (and often using the same roosts) each year to give birth and raise their pups.

Barbastelles show considerable 'winter hardiness', being unusually active (compared to other UK species) over the winter months, continuing to emerge to forage at night when conditions are reasonably mild.

The woodlands provide not only a range of suitable roost features with diverse conditions and microclimates, but also foraging areas, where barbastelles hunt for their insect prey using echolocation, and shelter, providing protection during adverse weather and a safe environment where the young can learn to fly and hunt for food.

1.3.3 Landscape use & Core Sustenance Zones

Barbastelles have large home ranges, travelling up to 20 km away from their roosts in a night to forage (more typically in Norfolk, 5-6 km and up to 11 km). Consequently, they have large 'Core Sustenance Zones' (CSZ, see definition box below), of 6 km radius around communal bat roosts, reflecting their requirement for substantial areas of good quality habitat to support viable colonies. Foraging habitats include woodlands, riparian habitats and hedgerows/field edges.

*“A Core Sustainance Zone (CSZ), as applied to bats, 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.** With reference to planning and development the CSZ could be used to indicate:*

- 1. The area surrounding the roost **within which development work can be assumed to impact the commuting and foraging habitat of bats using the roost...***
- 2. The area within which mitigation measures should ensure **no net reduction in the quality and availability of foraging habitat for the colony...***

*...Note: **There may be justification with Annex II and other rare species to increase the CSZ to reflect use of the landscape by all bats in a population”***

(Bat Conservation Trust⁵)

2. Data collection

2.1 Bat trapping surveys

Bat trapping surveys provide information on species presence, reproductive status and enable barbastelles to be fitted with radio-tags and/or rings. Bats are trapped in fine ‘mist-nets’, processed (biometric data recorded and, where applicable, a radio-tag and/or ring fitted) and then released.

We have undertaken eighteen bat trapping surveys in woodlands within the impact zone of the NWL, between 2018-2020, as part of our wider research. Bat trapping surveys were carried out in the periods May to early June and August, to gain key information on barbastelle maternity colonies whilst avoiding the mid-June to end of July period when trapping/tagging carries a significant risk of harm to heavily pregnant females and very young, dependent pups. All trapping sites are located between 0 - 3.9 km from the proposed road route, with the proposed NWL well within these colonies’ 6 km CSZs (note the need to increase the size of this radius for rare Annex II species (barbastelles) to reflect landscape use by all bats in the population).

2.2 Barbastelle radio-tracking

By temporarily fitting individual barbastelles with tiny, lightweight radio-transmitters, their movements can be tracked using a receiver and antenna, revealing roost locations, home ranges, foraging areas and commuting routes. Tracking also enable an assessment of habitat use and interactions with other landscape variables, such as existing roads and bat mitigation road crossing structures e.g. ‘green bridges’ and ‘bat gantries’ on the NDR.

⁵ Bat Conservation Trust (2016) Core Sustainance Zones: determining zone size. Bat Conservation Trust, London.

To date we have radio-tagged thirty-three adult female barbastelles from within the NWL impact zone (2018-2020, compared to the council's commissioned surveys for the NWL, which are based on seven radio-tagged barbastelles, 2019-2020).

2.3 Roost emergence counts & colony estimates

Once roosts are located through radio-tracking, the number of barbastelles emerging from each roost at dusk can be counted. A colony will make use of multiple roost trees within a woodland and at any one time the colony may be utilising any number of these (although typically bats within a maternity colony will be roosting together or split between a small number of these roosts at any one time). All roost trees in use by radio-tagged bats are counted simultaneously (on the same night) to give a minimum estimate of colony size. Counts are conducted by experienced bat surveyors, equipped with infrared night vision/recording equipment and bat detectors to enable species identification.

2.4 Acoustic data (bat activity levels)

Static bat detectors, which record bats' ultrasonic echolocation and social calls, have been positioned throughout key woodlands in the area. These data provide an index of barbastelle (and other bat species) activity levels, by analysing the number of bat 'passes' recorded for each species (identified from sonograms/spectrograms). Data have been collected each month over the last year (since March 2020) and data collection is ongoing.

Should the road scheme go ahead, these detectors will provide pre-construction baseline data on bat activity levels and species presence, which can be used to compare with post-construction data to enable an independent assessment of impacts on local bat populations. Detectors have been positioned at varying distances perpendicular to the proposed road route, allowing an assessment of how far away road impacts are evident on bat populations, should the road be built.

3. Preliminary results

3.1 Bat trapping surveys

To date we have trapped 462 bats from within the NWL impact zone (2018-2020), which includes 106 barbastelles (compared to the council's commissioned surveys for the NWL: 138 bats trapped, of which 10 were barbastelles (but only seven individuals)).

During trapping surveys we have recorded the following seven species from within the NWL impact zone:

- Barbastelle *Barbastella barbastellus*
- Common pipistrelle *Pipistrellus pipistrellus*
- Soprano pipistrelle *Pipistrellus pygmaeus*
- Natterer's bat *Myotis nattereri*

- Daubenton's bat *Myotis daubentonii*
- Brown long-eared bat *Plecotus auritus*
- Noctule *Nyctalus noctula*

Table 1 compares our bat trapping survey findings with those of the council's commissioned surveys for the major block of mature woodland habitat to be directly cut through by the road. In the period 2019-2020, we have trapped 114 bats in this woodland, of which 14 were barbastelles; the council's surveys during this same period trapped just nine bats and no barbastelles.

Table 1. Comparison of barbastelle bat trapping survey effort and findings: the council's surveys for the NWL (taken from their interim report⁶) and our surveys (Packman *et al. in prep*) for the major woodland block in the direct path of the proposed NWL, 2019-2020.

Survey findings ↓	Council's NWL surveys	Our surveys		
		19 th May 2019	31 st August 2019	10 th June 2020
Number of bats trapped	9	22	61	31
Number of barbastelles trapped	0	3	6	5
Number of barbastelles radio-tagged	0	2 (adult females)	3 (adult females)	3 (adult females)
Number of barbastelle roost trees located at site (cumulative)	0	2	10	
Barbastelle maternity colony presence identified from subsequent radio-tracking & roost counts?	No	Yes	Yes	Yes

3.2 Barbastelle radio-tracking

All-night tracking of barbastelles from key maternity colony woodlands within the 'Wensum Valley Super-Colony' (and within the impact zone of the proposed NWL) have provided detailed information on home ranges, foraging areas and commuting routes. Roost and foraging woodlands, other foraging areas and commuting routes within close proximity to the proposed NWL (northern section) are summarised in Figure 1.

Woodlands on and in close proximity to the proposed NWL route are used extensively as both roost sites (including maternity use) and foraging areas. The River Wensum is a major commuting route for the super-colony and the surrounding riparian habitat and floodplain are used extensively for foraging. At the northern end of the proposed NWL route, the road would cut through a complex network of commuting routes (between roost woodland and the river), foraging areas and maternity colony woodland.

⁶ WSP (2020) Appendix F – Bat Survey Report – 2019. Bat trapping and radio-tracking. Norfolk County Council.

Detailed, ‘close-approach’ radio-tracking enabled crossing points over major roads in the area to be located with a high degree of precision. Crossing points were at a few discreet locations and, predictably, where suitable habitat was located close to and on both sides of the roads, such as woodland/trees or vegetated waterways (unlit). Along the western section of the NDR, radio-tracked barbastelles crossed at two specific locations only (where habitat connectivity was best) and avoided the bat mitigation road crossing structures (a green bridge and a bat gantry) in the vicinity.

Furthermore, the Marriott’s Way is well used as a commuting route (and foraging area) for barbastelles in the super-colony (see Figure 1), but it was clear from the radio-tracking data that the green bridge was ineffective, with barbastelles flying up to the end of the vegetated corridors either side of the bridge, but not passing over the (exposed and mostly unvegetated) bridge itself (with a c. 300 m gap in vegetation cover over and either side of the bridge). Instead, barbastelles crossed the NDR c. 130 m to the east, utilising a quiet, dark, mature tree-lined lane, with a corresponding tree and hedgeline on the opposite side (a gap in vegetation cover of only c. 100 m).

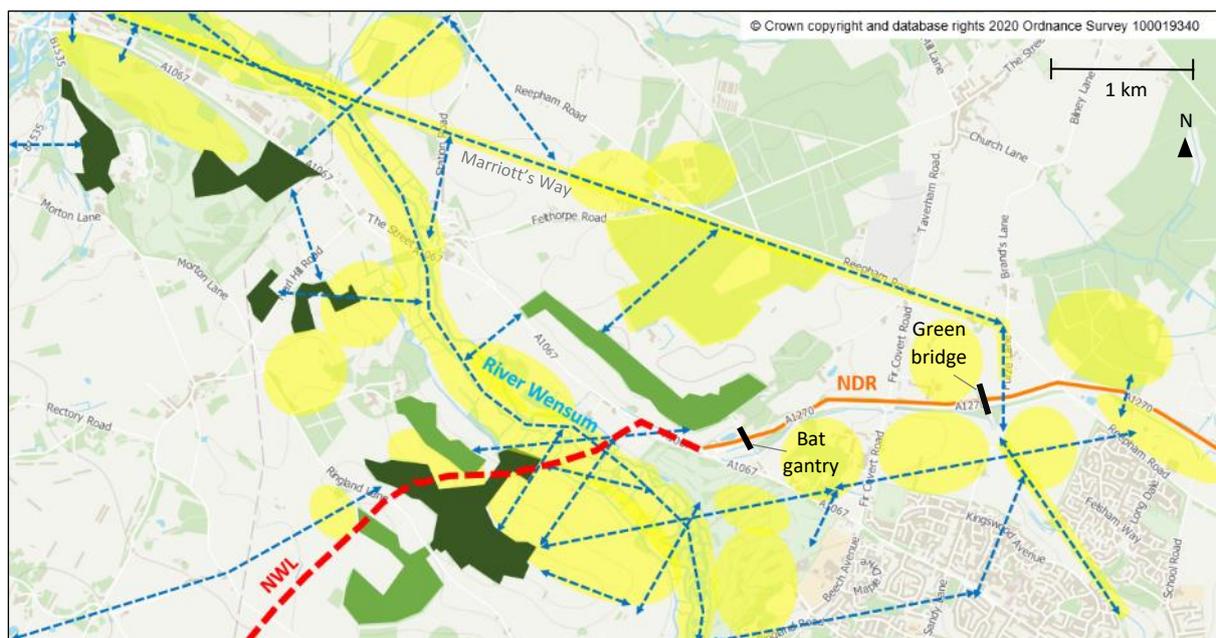


Figure 1. Summary schematic showing the key barbastelle areas which are in close proximity to the proposed NWL (northern section, red dashed line). Maternity colony (also used for foraging) woodlands shown in dark green, other barbastelle roost and key foraging woodlands in light green, foraging areas (outside of key roost/foraging woodlands) in yellow and main commuting routes with blue dashed arrows. The NDR (orange line) and bat mitigation road crossing structures within this area (green bridge and bat gantry) are also shown (labelled black rectangles). Overlaid on an Ordnance Survey map.

3.3 Roosts, emergence counts & colony size estimates

From radio-tracking adult female barbastelles in the area we have, to date, identified 63 roost trees within 3.5 km of the proposed road route.

Individual maternity colonies within the super-colony range in size from 27 - ≥ 105 barbastelles. Factoring in males, this gives a minimum estimate for the barbastelle population within the super-colony as a whole of 270 individuals.

Figure 2 shows the outer boundary of the merged (overlapping) 6 km Core Sustenance Zones around the known maternity colony woodlands in the area. The proposed NWL route cuts through the most critical area, the 'core of the cores', where all the CSZs overlap (i.e. the key area for all of the known maternity colonies within the super-colony).

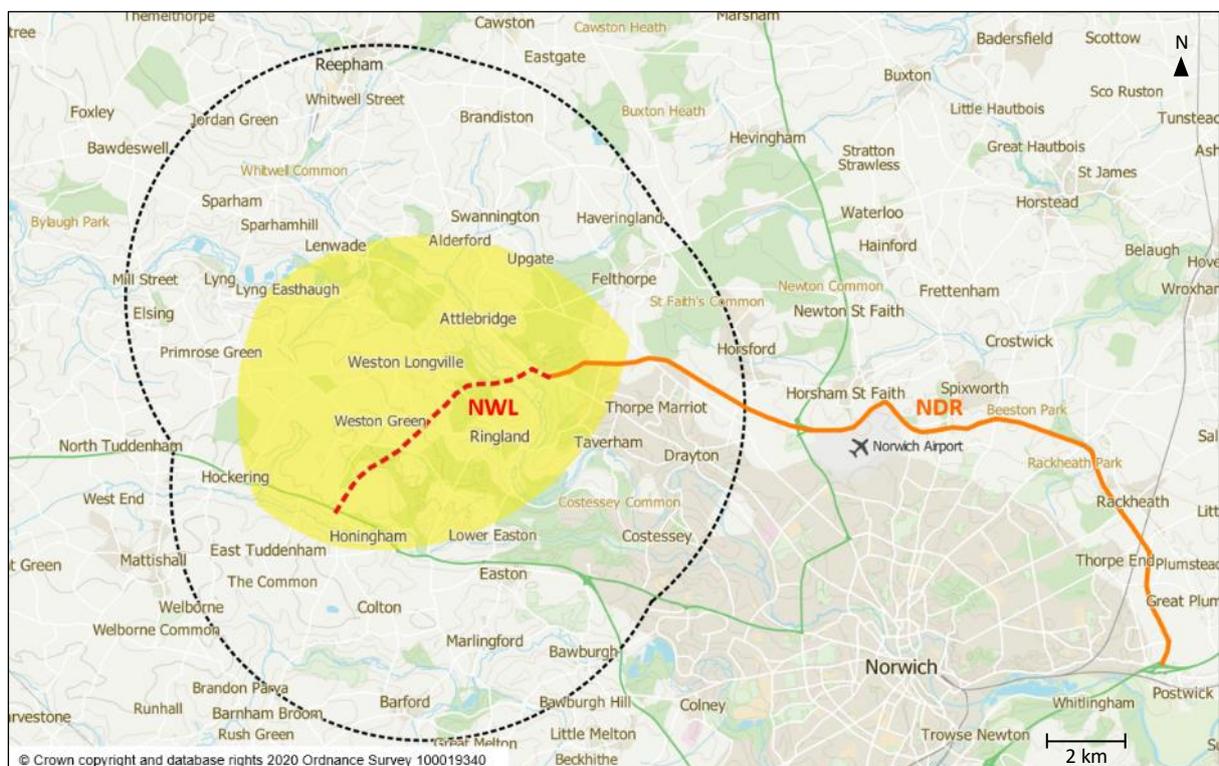


Figure 2. Outline of merged Core Sustenance Zones (black dashed line) around known barbastelle maternity colony woodlands in the vicinity of the proposed NWL, with the 'core of the cores' (the area where all six CSZs overlap) highlighted in yellow. Overlaid on an Ordnance Survey map and with the NDR (orange line) and proposed NWL (red dashed line) highlighted.

3.4 Acoustic data (bat activity levels)

The bat acoustic data are still being collected and analysed. However, based on preliminary analyses:

- 10 bat species have been recorded within woodlands in the NWL impact zone
- High levels of barbastelle activity have been recorded
- In winter/spring 2020, barbastelles were the second most commonly recorded species (after soprano pipistrelle)
- In summer 2020, barbastelles were the third most commonly recorded species, after soprano and common pipistrelles

4. Conclusions

The importance of this area for barbastelles is summarised by Emerson *et al.* 2020⁷, on the basis of this research: *“there are several areas within Norfolk where high levels of activity have been recorded, including in the Wensum Valley where extensive radio-tracking work has been carried out to locate roosts of this species. The Wensum Valley appears to be a stronghold for this red-listed species in Norfolk and is likely to be important in a national context. This population is under threat by the proposed Western Link road in Norwich... loss of old mature woodland and veteran trees is the greatest threat”.*

The proposed NWL is planned to pass through what is one of the most important areas in the country for barbastelles, which are ‘at imminent risk of extinction’ (Mammal Society 2020). Our research has revealed the presence of the first known barbastelle ‘super-colony’ in the UK (the ‘Wensum Valley Super-Colony’) with an estimated minimum population size of 270 barbastelles. It also includes the largest known extant roost in the country (≥ 105 barbastelles), one of 64 roosts identified to date as being used by the super-colony. The proposed NWL would pass through the ‘core of the cores’; the critical area where the CSZs for each of the maternity colony woodlands overlap. In both summer and winter, barbastelle activity levels in this area are exceptionally high. As a result there is a very high risk that the proposed route of the NWL would have a very negative impact on this population, of significant national importance, which is vital to the future persistence of this threatened species.

The council commissioned bat surveys to inform decision making concerning the NWL. The research reported on here shows that the council’s assessment of impacts on barbastelles have been seriously underestimated. The much more comprehensive bat trapping and radio-tracking surveys summarised in this letter more accurately determine the significance of the threat to this rare species. The council’s surveys will have substantially underestimated impacts on barbastelles, as the significance of the area for this rare species

⁷ Emerson, J., Farrow, F., Leech, T., Parmenter, J. (eds) (2020) Norfolk’s Wonderful 150. Norfolk & Norwich Naturalists’ Society Occasional Publication 18. Norfolk & Norwich Naturalists’ Society, Norwich.

was missed, a reflection of the paucity of bat trapping and barbastelle radio-tracking data (as documented here, in comparison to our independent, voluntary surveys carried out in the area by professional ecologists). The council's surveys failed to identify a barbastelle maternity colony in the major woodland in the direct path of the road, have only identified a handful of barbastelle roost trees in the area, have overlooked the presence of the super-colony within the road's impact zone and substantially underestimated the significance of the barbastelle population in the area. The concept of CSZs has also been overlooked, with insufficient scale and reach of impacts considered, given that barbastelles have very large home ranges, with a CSZ of 6 km radius. Consequently, **the council's presumption that impacts of the proposed NWL on the barbastelle population can be mitigated and compensated for is flawed and based on inadequate data.**

The destruction of barbastelle maternity colony woodland (used throughout both the critical summer and winter periods) is not permissible under UK wildlife laws and would be unprecedented. Our independent Ecological Impact Assessment for the NWL (and its associated substantial construction corridor) on barbastelles includes:

- Destruction of barbastelle maternity colony (and foraging) woodlands
- Habitat fragmentation
- Habitat degradation
- Loss of foraging habitat
- Severance of bat commuting routes
- Bat fatalities resulting from collisions with vehicles
- Disturbance from noise and light

The council's Environmental Impact Assessment Scoping Report⁸ suggests that green bridges, underpasses and culverts would be used on the NWL scheme as mitigation against bat fatalities from vehicle collisions and severance of commuting routes. **Evidence shows that similar approaches on the NDR have failed and analysis of commuting routes in our study has revealed new evidence that barbastelles avoid using bat mitigation road crossing structures including green bridges and bat gantries.**

Compensation that has been proposed for loss of roost and foraging woodlands includes planting of tree saplings. A complex, mature woodland ecosystem capable of supporting a barbastelle maternity colony (providing a variety of roosts, shelter, abundant insect prey etc) takes hundreds of years to develop; tree whips are not replacement habitat for mature woodland ecosystems. Bat boxes have also been proposed to provide replacement roost features yet have notoriously poor uptake by bats and again, are unrealistically simplistic; they are not a replacement for mature woodland with many different roost niches and associated conditions that support colonies.

⁸ WSP (May 2020) Norwich Western Link Environmental Impact Assessment Scoping Report. Norfolk County Council.

There has been no proposed mitigation/compensation for other predicted significant impacts on barbastelles and **there is a lack of evidence to demonstrate that the council's proposed mitigation and compensation measures would succeed in protecting these barbastelle colonies**. Failures in the NDR mitigation/compensation for bats and the apparent disappearance of the two barbastelle colonies that were located within 2.5 km of the road prior to construction are deeply concerning and do not bode well for the remaining key population, the Wensum Valley Super-Colony, should the NWL be built.

Under The Conservation of Habitats and Species Regulations 2017, **'any disturbance which is likely to impair their ability to breed or reproduce or rear or nurture their young or to affect significantly the local distribution or abundance of the species'** (for protected species which include barbastelles) **is an offence**. In order to legally proceed with the road scheme, a derogation licence must be sought from Natural England and can only be granted if three tests are met: 'imperative reasons of overriding public interest' (IROPI Test), 'no satisfactory alternative' (NSI Test) and 'maintenance of Favourable Conservation Status' (FSC Test). **It is clear that the FSC test for barbastelles cannot be met here**, satisfactory alternatives do not appear to have been meaningfully explored and IROPI seems improbable. Consequently, **the road cannot proceed, as proposed, in compliance with wildlife laws and without causing significant harm to the country's fragile barbastelle population**.

Given the **exceptional importance of the Wensum Valley barbastelle population**, we propose that key roost, foraging and commuting habitats should be robustly protected from future threats by **designation of a barbastelle Special Area of Conservation** (as required under The Conservation of Habitats and Species Regulations 2017).

Yours sincerely,

Signatories:

- *Dr Charlotte Packman* (Director, Wild Wings Ecology & Associate, University of East Anglia) – main contact*
- *Dr Iain Barr* (Senior Lecturer in Ecology, University of East Anglia)
- *Dr Stuart Newson* (lead on Norfolk Bat Survey, British Trust for Ornithology & member of Natural England's Bat Expert Panel)
- *Richard Moores* (Norfolk Mammal Recorder)
- *Jane Harris* (Research Project Officer, Norfolk Barbastelle Study Group)
- *Ash Murray* (Chair, Norfolk Barbastelle Study Group)
- *John Hiskett* (People & Wildlife Manager, Norfolk Wildlife Trust)
- *Holly Nichols* (Assistant Ecologist, Wild Wings Ecology)
- *Georgina Lester* (MSc research student, University of East Anglia)
- *Mick Finnemore* (Bat Ecologist)
- *Nick Pinder* (Bat Ecologist)

*Contact for enquiries: Dr Charlotte Packman (email lotty@wildwingsecology.co.uk)