

Mr Tom McCabe, (By EMAIL)
Head of Paid Service,
County Hall,
Martineau Lane,
Norwich,
Norfolk,
NR1 2DH.

May 21st, 2021

Dear Mr McCabe,

Evidence of Barbastelle Bat Super-Colony - Open Letter

We wish to register a formal complaint about the Council's decision to publicly dismiss without good cause or justification the independent ecological evidence recently submitted by, and in the name of, a number of leading ecologists and scientists.

This is an open letter. For their interest, we are specifically copying this letter to several environmental and transport organisations who are working to protect wildlife and nature and secure a safe future climate, via progressive and transformational transport policies (see list at end). We take the Climate and Ecological Emergency seriously, and note NCC claims to do so too, in the Environment Policy.

The Council must be honest, open and transparent about the recent discovery of a super-colony of a European Protected Species, and on its status and the most up-to-date and robust evidence on it.

The requirement for full disclosure of all ecological evidence has now become urgent as a date has now been set for Cabinet and full Council to decide and debate the business case to the Department of Transport, and the contractor procurement.

Trustworthy and legitimate decisions cannot be taken on June 7th, without all councillors being fully briefed and aware of all the ecological evidence (not just evidence it has commissioned). This must happen before councillors receive agenda papers for these meetings¹.

In support of this complaint we wish to refer to the Barbastelle Bat Research Findings report dated 26th, February 2021², and also the Report of Dr Mark Hassall dated 19th, February 2021.

Report of 26th, February 2021

The primary findings of this report can be summarised as follows:

¹ s.100D(5) of the Local Government Act 1972 and with reference to the judgment in R (Joicey) v. Northumberland CC [2014] EWHC 3657 (Admin) and Hale Bank Parish Council v Halton Borough Council. Case Number: CO/1023/2019

² As signed by Dr Charlotte Packman (Director, Wild Wings Ecology & Associate, University of East Anglia), 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) and Nick Pinder (Bat Ecologist). Available at: http://bit.ly/2021Feb_BatResearch

1. The proposed route of the Norwich Western Link (NWL), and the construction channels, pass through the UK's only known Super-Colony of a very rare and highly protected bat species, the barbastelle (>60 roosts).
2. Part of this Super-Colony is located within the main block of woodland to be directly impacted by the road, (home to a maternity colony), if built.
3. The presence of these bats elevates the conservation value of the land through which the road is to pass to a pSAC and also satisfies the criteria for designation as a Site of Special Scientific Interest.
4. Proposed mitigation is very unlikely to prevent habitat fragmentation, habitat degradation, loss of foraging habitat, severance of bat commuting corridors, bat fatalities due to collision with motor vehicles and disturbance from noise and light³. This view is supported by a Position Statement issued by the Bat Conservation Trust on 4th, March, 2021⁴

Report of 19th, February 2021

This report is presented by a senior and well-respected animal ecologist with over 45 years of experience and is based on an analysis of your contractor's report on findings made during bat surveys. Dr Hassall's findings can be summarised as follows:

³ Dr Hassall is also of the opinion that there exists no evidence demonstrating the proposed mitigation will work. He states: ***'...that the "Achilles heel" in the NCC case is their claim that damaging impacts to the barbastelle bat colony caused by the proposed development could be avoided by using mitigating measures such as gantries, green bridges and underpasses. As far as I am aware there is no published evidence to support this claim. On the contrary the completely unique biology of barbastelles make it highly unlikely that such measures would be successful for this species, however successful they may be for other species such as pipistrelle, brown long eared or Daubentons bats'***

⁴ <https://www.bats.org.uk/our-work/biodiversity-policy-advocacy/position-statements-1/bcts-position-statement-on-the-proposed-norwich-distributor-road-western-link>

1. The Council's own contractor's evidence supports a high level of barbastelle bat presence and activity on or close to the proposed route of the road.
2. These findings by the contractor do not support NCC's position that the construction and the operation of the road if built will have no deleterious impact on the UK's largest Super-Colony of barbastelle bats.
3. On the contrary, the road will result in a high risk of detrimental effects on the colony due to the inevitable disturbance and destruction of sheltering sites and foraging habitats.
4. Due to metapopulation dynamics implications the adverse impact of the road on the colony may also impact on the size and longevity of other populations of barbastelle bats located in other parts of Norfolk.
5. The reason mitigation is unlikely to prevent the new development from causing damaging impacts on barbastelle bats is because of the exceptionally high fidelity of barbastelle bats to both their sheltering and feeding sites, not only within seasons but also between years and therefore their corresponding high fidelity to connecting flight paths. Barbastelle bats are therefore extremely unlikely to deviate from these traditional "commuting" routes whatever mitigation measures are provided.

The findings and conclusions of these reports are based on solid scientific findings and input from leading independent ecologists and scientists. They

all point to the indisputable presence and high activity levels of a strictly protected and threatened mammal species in and around the proposed route and construction corridors of the road.

Complaint

The significance and importance of noting the presence and activity of the barbastelle bat when it came to assessing and selecting a route for the road was evident throughout NCC's Option Selection Report dated July 2019.

The relevant extracts are as follows:

5.8.8

Bat surveys primarily focussing on the rare barbastelle bat began in May 2019 and will continue until September 2019. The results of these surveys have been used to help inform this assessment. **The barbastelle bat receives European legal protection and is a significant ecological consideration for the scheme.** Additional habitat and species surveys are currently being undertaken.

5.8.17

Barbastelle could be dependent on the woodland habitat along the route, as a known barbastelle maternity colony is located within 300m of the route near to Morton. Within the Dinosaur Park/Morton area there are multiple known roosts of barbastelle and it is considered that this area is of particular importance to the colony and the area of highest conservation significance to

barbastelle in the study area. Areas where maternity colonies are located are of high conservation significance and can be vulnerable to disturbance. At this very close distance the bats could be particularly vulnerable to lighting and noise impacts from Route A. The severance of woodland and hedgerows may have significant impacts on barbastelle commuting between roosts and foraging habitat.

5.8.24

The route is close to the known maternity roosts around Morton. As indicated above in Route A analysis, due to the multiple known roosts the barbastelle colony uses in the area it is considered that the area is of higher conservation value and importance to barbastelle bats. The barbastelle bats using the Morton area would be vulnerable to disturbance from Route B due to the very close proximity of the route to the known roost sites. In addition possible maternity roosts, of barbastelle bat have been recorded in woodlands the route impacts in the south from the May 2019 bat surveys. One of the woodlands that the route bisects comprises a thin strip running along the south side of The Broadway where one of the possible maternity roosts was recorded. This woodland is connected to another woodland: Foxburrow Plantation, running parallel to The Broadway and linking into Hall Hills woodland. Within Hall Hills another possible maternity roost of barbastelle was located. It has not been confirmed whether these roosts are just gathering roosts or are part of a separate maternity colony within the study area. However the data collected to date does not indicate that The Broadway and Hall Hills woodland area are of the same conservation value as the Morton area. Given the surveys undertaken this May, recorded interchange between

bats using these roosts and bats within the Morton area, it is possible that they form part of the Morton area maternity colony.

5.8.25

The May surveys also highlighted the importance of the woodlands in the northern and southern part of the route to foraging and commuting barbastelle. The habitat removal and disturbance within the woodlands is likely to have significant negative impacts for the barbastelle bat colony.

5.8.31

The route is close to the known maternity roost around Morton. As indicated above in Route A analysis, due to the multiple known roosts the barbastelle colony uses in the area it is considered that the area is of higher conservation value and importance to barbastelle bats. The barbastelle bats using the Morton area would be vulnerable to disturbance from Route B due to the very close proximity of the route to the known roost sites. In addition, two possible maternity roosts of barbastelle bat have been recorded in woodlands the route impacts in the south from the May 2019 bat surveys. One of the woodlands which the route bisects comprises a thin strip running along the south side of The Broadway where one of the possible maternity roosts was recorded. This woodland is connected to another woodland: Foxburrow Plantation, running parallel to The Broadway and linking into Hall Hills woodland. Within Hall Hills another possible maternity roost of barbastelle was located. It has not been confirmed whether these roosts are just possible maternity roosts or are part

of a separate maternity colony within the study area. However, the data collected to date does not indicate that The Broadway and Hall Hills woodland area are of the same conservation value as the Morton area. Given the surveys undertaken this May, recorded interchange between bats using these roosts and bats within the Morton area, it is possible that they form part of the Morton area maternity colony.

5.8.32

The May surveys also highlighted the importance of the woodlands in the northern and southern part of the route to foraging and commuting barbastelle. The habitat removal and disturbance within the woodlands is likely to have significant negative impacts for the barbastelle bat colony

5.8.38

Two possible maternity roosts of barbastelle bat have been recorded in woodlands, which the route will impact in the south, from the May 2019 bat surveys. One of the woodlands which the route bisects comprises a thin strip running along the south side of The Broadway where one of the roosts was recorded. This woodland is connected to another woodland: Foxburrow Plantation, running parallel to The Broadway and linking into Hall Hills woodland. Within Hall Hills another possible maternity roost of barbastelle was located. It has not been confirmed whether these roosts are just gathering roosts or are part of a separate maternity colony within the study area. However, the data collected to date does not indicate that The Broadway and Hall Hills woodland area are of the same conservation value as the Morton area. Given the surveys undertaken this May recorded interchange between

bats using these roosts and bats within the Morton area it is possible that they form part of the Morton area maternity colony.

5.8.39

The May surveys also highlighted the importance of the woodlands in the southern part of the route to foraging and commuting barbastelle. Without mitigation the habitat removal and disturbance within the woodlands is likely to have significant negative impacts for the barbastelle bat colony.

5.8.55

Given the nature of the landscape in the north-western corner of the study area i.e. lots of fragmented woodland and the proximity of the Morton barbastelle colony roost area containing multiple barbastelle roosts, mitigating for the impact of route options A and both B options will be difficult and potentially very expensive. Multiple bat crossing areas would be required to ensure safe passage of foraging and commuting bats in this area.

5.8.56

Route Option C is located further away from the identified maternity roost area however Route Option C and B (East and West) bisects a woodland known to contain a possible maternity roost of barbastelle bats along The Broadway. The route crosses perpendicular to The Broadway woodland through a strip of woodland less than 40m wide. Mitigation for foraging and commuting bats using The Broadway woodland and Foxburrow Plantation could comprise two green bridges or underpasses. Given the linear nature of these woodlands

mitigation in this area is considered likely to be successful as bats are effectively 'channelled' to follow the linear woodlands.

5.8.57

Route Option D also has the potential to impact barbastelle bats however due to land access constraints the bat data along this route is more limited than the other routes. Where access was possible barbastelle bats have been recorded along the route during the May surveys. Route option D causes the highest level of fragmentation of the landscape as it severs multiple woodlands and also passes in between more blocks of woodland compared to all other routes. Therefore, mitigation along this route has the potential to be very expensive as potentially multiple green bridges and/or underpasses would be required to ensure ecological linkages existed once the route was constructed.

5.8.62

The very large adverse impact categorisation for routes A and B West and East are due to these routes impacting the ecological features in the study area (recorded so far) that receive the highest legal and policy protection; namely the River Wensum (SAC and SSSI) and barbastelle bat

5.8.65

Route Option D is likely to have the greatest ecological impact on the most ecological features, as it would affect seven of the 11 key ecological features identified. Route D would be likely to cause the greatest amount of severance and fragmentation of habitats of conservation importance and is therefore

likely to give rise to the most direct and indirect impacts on species of conservation importance using these habitats, in particular barbastelle bat

5.8.66

Route Option B (western variant) also has the potential to affect ecological features of particular importance namely the River Wensum SAC and the barbastelle bat. Route B (western variant) has the potential to give rise to significant effects on the Wensum because of the requirement for a new bridge crossing which is likely to give rise to loss of river habitat. Both variants for Route B are close to the Morton area barbastelle maternity colony and the possible maternity roost recorded along The Broadway. The routes also bisect core barbastelle bat foraging areas and commuting habitat. The habitats in the northern part of route B include multiple small blocks of woodland which would make mitigation options difficult and potentially very expensive as multiple new crossing points would be required.

5.8.68

Route Option A was considered to have least impact across the 11 key ecological features identified (including for the Wensum). The route is largely located within a more arable landscape than the other route options and so fragmentation impacts are considered to be minimal. However, this route has the potential to have a significant impact on the Morton barbastelle colony due to the very close proximity of the roosts to the route. As outlined above this would be difficult to mitigate for and so adverse impacts on bats as a result of this route are considered possible.

The above demonstrates:

1. The barbastelle bat is regarded as a significant ecological consideration.
2. The impact on this species if the NWL was to be constructed is viewed as a significant adverse risk.
3. Areas where maternity colonies are located are of high conservation significance and can be vulnerable to disturbance. At this very close distance the bats could be particularly vulnerable to lighting and noise impacts. The severance of woodland and hedgerows may have significant impacts on barbastelle commuting between roosts and foraging habitat.
4. The habitat removal and disturbance within woodlands is likely to have significant negative impacts for the barbastelle bat colony.
- 5. The ecological considerations surrounding the presence and activity of the barbastelle bats relied upon when Route C was chosen are no longer valid, and are now similar, if not greater in weight, than the considerations that led to the discounting of the other routes.**
6. NCC chose their preferred route before the WSP Interim report was published, and indeed changed their brief for the surveys commissioned to WSP , in the summer of 2019, from a comparative study of several of the route options, to just concentrating on the preferred route (WSP Interim Report). Thus it appears that a substantial sum of public money was spent to provide ecological evidence to inform and validate a decision that had already been made

Ground 1 of the complaint

You have failed to attach sufficient, if any, weight to the Council's own independent contractors' findings of a high level of barbastelle bat presence and activity on or close to the proposed route of the road.

You have also failed to attach sufficient, if any, weight to the overwhelming independent expert evidence pointing to the existence of a large and active Super-Colony of barbastelle bats in and around the proposed route, together with your failure to publicly recognise the cogency and significance of the evidence.

Since the evidence was produced, members of your project team have repeatedly stated in public that there is no evidence of high activity of barbastelle bats in and around the preferred route and construction channels⁵.

You have also repeatedly accused, unjustly, one of the experts, Dr Charlotte Packman, of physically disrupting a survey undertaken by your contractor in the summer of 2020. There is no evidence to corroborate the claim and it is clear this contention has one objective, and one objective only and that is to discredit the findings of Dr Packman.

This has caused Dr Packman undue stress, as has the strong pressure NCC has continued to place her under not only to provide summaries of her analyses, which she has now already provided, but also by reason of ongoing unreasonable demands that she should share her original raw data with NCC.

⁵ <https://www.edp24.co.uk/news/local-council/ndr-western-link-threatens-uk-largest-barbastelle-bat-colony-6575386>

This is completely contrary to established research ethics. If a research scientist were to make their data available on demand in this way it would seriously impair their chances of getting analyses of these data published in main line scientific journals (the editors of which insist that none of the data have been previously released). Publications in mainline journals constitute the key currency of a research scientist's career. For a young female scientist, relatively early in her career, working in isolation, (i.e., not as part of a larger team) to be repeatedly pressurised so strongly by Councillors and NCC Project Team, into doing something that could potentially compromise her career appears to be irregular and highly inappropriate conduct.

Your ongoing refusal to recognise the evidence produced by these experts can only be seen and interpreted as an expression of doubt as to the integrity of the evidence and the signatories of the report supplied. It also provides the public with a misleading picture of the current status of the ecological considerations relating to the road.

The council is required to be honest, open and transparent in all of its dealings with the public. By failing to share accurately with councillors and the public the true nature and significance of this expert evidence the Council has, in our submission, failed to uphold these values and act solely in terms of the public interest⁶.

This is of particular relevance in the light of the forthcoming meetings on 7th June when the cabinet and full council will be expected to make major funding decisions in respect of the project. The failure to recognise the importance of this evidence and the lack of full, complete and accurate ecological evidence

⁶Seven Principles of Public Life

from the Council's own surveying can only serve to reinforce our views as stated above and below.

Ground 2 of the complaint

The failure to recognise the significance of the evidence and to attach sufficient if any weight to the findings as part of ongoing ecological investigations, and preferring instead to duplicate the surveying, also raises a question about the handling and application of public funds. To engage and fund further surveying, when robust evidence already exists, calls into question the Council's duty to ensure public resources are used prudently and in accordance with its rules and the Seven Principles of Public Life.

Ground 3 of the complaint

Notwithstanding the weight and cogency of the expert evidence produced, the Council has failed to undertake a review of the ecological considerations that led to the decision to adopt Route C over and above other considered routes.

It is clear from the extracts taken from the Options Report, as outlined above, that the expert evidence casts serious doubt on the soundness of the route selection process when it is clear the ecological factors that played a significant part in the decision of the Council to discount the other route options, now also apply to the chosen route, Route C.

It is incumbent on the Council in terms of its obligation to act at all times in the public interest to identify material changes in circumstances as and when they

happen and to review when necessary decisions taken, especially when in the present case the decision can no longer be regarded as rational and if not changed could lead to the misapplication of public funds.

We would ask for the above to be investigated. We seek the following remedies:

1. The publication of a statement within the NWL part of the Council's website of the two reports together with a commentary to acknowledge the findings they contain and in particular the presence and activity of barbastelle bats in and around the scheme boundaries, and for this to happen prior to publication of agenda papers for the June 7th, meetings.
2. A commitment given to use the highly reliable evidence already collected as part of your ecological investigations, and to rely on that evidence rather than expose the bat population in the area to the disturbance of further unnecessary surveys.
3. The immediate establishment of a public review of the preferred route in the light of the expert evidence produced and to take this step before entering into any contractual obligation with a contractor to undertake the construction of the proposed road.
4. Confirmation to be given that the two expert reports have been shared with Natural England and also all prospective building contractors.

5. Clarification of the claim that not all evidence has been shared with the Council. Please identify the 'missing' evidence and explain for what purpose this is needed.

6. Inclusion of reference to the evidence and the pSAC to be added to the Local Transport Plan 4 and the Greater Norwich Local Plan, and to the associated Habitats Regulations Assessments for those documents.

Please acknowledge receipt of this letter and we look forward to receiving a full reply to this formal complaint in due course.

Yours Faithfully

Dr Andrew Boswell for Climate Emergency Planning and Policy (CEPP)

Cllr Denise Carlo, Norwich City Council

David Pett Solicitor for Stop the Wensum Link Campaign

Dr Iain Robinson UEA Lecturer and Woodland Owner

Address for contact:

[REDACTED]
[REDACTED]
[REDACTED]

CC

Helen Edwards

Chris Dady, Chair, CPRE Norfolk

Professor Tim O’Riordan, President, CPRE Norfolk
Michael Rayner, CPRE Norfolk
David Hook, CPRE Norfolk
Nik Khandpur, Norfolk Wildlife Trust
Kevin Hart, Norfolk Wildlife Trust
David Diggins, Chief Executive Officer, Norfolk Rivers Trust
Kit Stoner, Chief Executive, Bat Conservation Trust
Sam Hunter-Jones, Lawyer, ClientEarth
Chris Todd, Director, Transport Action Network
Asher Minns, Tyndall Centre, University of East Anglia

Norfolk County Councillor Brian Watkins
Norfolk County Councillor Tim Adams
Norfolk County Councillor Steve Morpew
Norfolk County Councillor Emma Corlett
Norfolk County Councillor Ben Price
Norfolk County Councillor Jamie Osborn
Norfolk County Councillor Ed Maxfield
Norfolk County Councillor Jim Moriarty
Norfolk County Councillor Alex Kemp

[Redacted]

Councillor Andrew Proctor
Leader of Norfolk County Council
Norfolk County Council
County Hall
Martineau Lane
Norwich
Norfolk
NR1 2DH

19.02.2021

Dear Councillor Proctor

During a recent Parish Council meeting, County Councillor Greg Peck reported on progress with the proposed Norwich Western Link road (NWL). I am writing to try to assist the Council with evaluating the ecological consequences of the proposed development. As a senior professional animal ecologist for over 45 years, I feel I may be able to offer a rather different ecological perspective on the results presented by WSP in their interim report (2020) from that given by Councillor Peck. My purpose is to interpret these data in the context of other published studies on barbastelle bats and in relation to wider ecological theory.

I believe that the results of the WSP interim survey provide clear and conclusive evidence that there is a high risk that the planned development of the preferred route for the NWL could have a highly detrimental impact on a very important population of a rare, declining and internationally protected species of bat. I feel that it is important to ensure that the development of the NWL does not violate national biodiversity objectives.

I am writing as a Norfolk resident and professional ecologist, not on behalf of my local Parish Council.

With kind regards

[Redacted signature]

Dr M Hassall FRES
(Emeritus Reader in Animal Ecology, School of Environmental Sciences, University of East Anglia)

A Case for Interpreting Results in the Interim Report by WSP (2020) in the Contexts of the Wider Ecology of Barbastelle Bats and of Ecological Theory

Introduction

1. Construction of the Norwich Northern Distributor Road (NDR) stopped when it joined the A1067. Further scientific evidence of potentially harmful impacts on the ecology of the Lower River Wensum Valley were required before proposals for a link to the A47 could be fully evaluated.
2. Provisional plans for several possible routes were evaluated in relation to political and economic criteria, but not with respect to all aspects of the scientific case, as key surveys had not yet been completed when the preferred route was chosen.
3. Since the preferred route was chosen new scientific discoveries reported in the first Interim Report by the appointed ecological consultancy WSP (WSP 2020) show that there is a high risk that building the NWL along the preferred route would significantly damage an important and nationally valuable colony of one of the UK's rarest mammals, the barbastelle bat. The largest colony of this declining species in the UK is present in the Lower Wensum Valley (Wild Wings Ecology data), straddling the route that NCC chose as its preferred option for the proposed NWL before the new scientific discoveries by WSP could be taken into consideration.
4. As it seems that identification of the preferred route could not take into account all the relevant scientific evidence (because it was not available when the choice of preferred route was made), there is a case for suspending further development of the Outline Building Case along this preferred route, at least until the results of 2020 survey work commissioned by NCC are available. From the proposals for the further work listed on p59 (WSP 2020) it is every unlikely to alter conclusions drawn from the results of the 2019 surveys which already provide ample scientific evidence of how damaging this development is likely to national and international interests.
5. The Wensum Valley is of exceptionally high biodiversity value, containing several areas of nationally and internationally designated interest (WSP 2020), but its importance for one of the rarest mammals in the UK was not fully apparent until the WSP Interim Report was published. The extreme rarity of this species (British Mammal Society Red list 2020) places a strong onus on NCC to show that a species with such high biodiversity value will not be harmed by the proposed development (Geneletti 2003).
6. As fully acknowledged in the WSP (2020) report, the presence of barbastelle bats is a very important wildlife feature of the Lower Wensum Valley (Wild Wings Ecology 2019), as this is one of the rarest and declining species of mammal in the UK. Although there is a compelling socio-economic rationale at the local and regional levels, the very high value of one of the rarest bats in Western Europe (Rebello & Jones 2010) is of great concern at both national and international levels.

The Area Surveyed in the WSP Interim Report (WSP, 2020)

The ecological survey commissioned from WSP covered all species of bat but was restricted predominantly to an area immediately adjacent to the preferred route. Some potential day sheltering sites, summer maternity shelter sites and hibernating sites were identified. Due to access constraints, radio-telemetry surveys could not be undertaken in such close vicinity of the corridor of the “preferred route”. Instead telemetry studies were focused the Golf Course/Dinosaur park site. This is only c. 2km from the preferred route so is well within the average home range of 6.5km diameter reported in Section 4.5 WSP 2020.

Summary of Key Survey Results

7. Radio telemetry studies revealed the presence of nine roosts used by the tagged bats (Table 4.8 (WSP 2020)). The closest of these roosts, that may possibly have been “maternal roosts”(Section 4.5.5.(WSP2020)) was only 440m from the planned preferred route. Up to 27 barbastelle bats were observed leaving roosts used by tagged pregnant individuals. The ground level tree surveys revealed that there were 77 trees, within 50 m of the preferred route, that had either high or moderate potential to support bat roosts. Very high numbers of barbastelle bat calls (from a wide range of locations within 500m along the preferred routes) and 23 records of barbastelle presence made from vantage points mostly within 50 - 100m of the preferred route during May to mid-June 2019 indicate a very high level of barbastelle bat activity in the immediate vicinity of the preferred route. **This provides clear new scientific evidence that were this route to be developed, there would be a very high risk that it would disturb and disrupt the activities of a significant number of this very rare species.**

The Risk of Direct Mortality Due to Increases in Road Kills.

8. The new scientific evidence in the WSP Interim Report (Tables 4.3, 4.5 & 4.6) clearly indicates that members of this Lower River Wensum Valley colony of barbastelle bats use the corridor of the preferred route both intensively and extensively. Barbastelle bats, while a highly mobile species (Kuhnert et al 2016), show very high fidelity (are highly faithful) to both sheltering sites and foraging sites and the commuting flight paths between them (Hillen et al 2011, Zeale et al 2012; Gotwald et al 2017). This behavioural inflexibility makes them particularly poorly adapted to withstand changes in their environment, such as the development of a new highway (Hillen et al 2009). **Therefore a significant number of barbastelle bats will be placed at increased risk of being killed, as the result of collisions with motor vehicles, if the NWL were to be constructed on the preferred route.** Furthermore this risk is higher for barbastelle bats, than for other species of bat, because in open habitats barbastelle bats forage closer to the ground than most other species of bat (often within 1-2 metres above ground level) and therefore they are more vulnerable to being killed in collision with motor vehicles than many other species of bats (Keith & Melber 2009). This conclusion is supported by analyses of bats killed on roads in mainland Europe, where barbastelle carcasses have been found, despite the species’ rarity (Medinas et al 2013).

Potential Adverse Effects of Development on Foraging Behaviour of Barbastelle Bats.

9. Barbastelle bats typically feed in more than one foraging habitat during a single foraging trip (Zeale 2012). Exhibiting partial feeding preferences (Hassall & Lane 2005) by foraging in more than one habitat within a single foraging trip enables animals to feed on different species of prey with different and complimentary nutrient profiles. They are thus able to ingest their required dietary nutrients more efficiently than if foraging in a single habitat in accordance with the geometric framework model of mixed diet theory (Simpson and Raurbenstein 2012). Failure to obtain the right balance of nutrients would be likely to adversely affect reproductive success and hence reduce abundance. **Disturbance and disruption of any of the combination of feeding sites used would therefore risk damaging the future viability of this colony**, particularly in the context of the national decline of macro-moths (Fox 2013). In the lower Wensum Valley barbastelle bats forage along woodland edges, field boundaries, above rivers, and extensively over flood plain pastures. The availability of this combination of required feeding habitats in one locality has declined significantly in the UK due to changes in land use and agricultural practices.
10. Barbastelle bats feed predominantly, up to 99%, on moths (Sierra & Arletteaz & 1997) although they sometimes ingest 4 – 17% of Diptera with only traces members of other insect orders (Rydell et al 1996). Large species of moths are strongly preferred (Andreas et al 2012) even when their abundance is relatively low compared to high densities of smaller species. **Barbastelle bats thus have a very narrow trophic niche making them especially vulnerable to disturbance of their feeding grounds.** Individual barbastelle bats have an exceptionally high fidelity to specific foraging localities, with individuals returning to the same place to feed not just on successive nights but also during successive seasons (Hillen et al 2011, Zeale et al 2012). Any disturbance of these key feeding grounds could therefore have long term deleterious effects.

Potential Adverse Effects of Development of the NWL on Sheltering Behaviour of Barbastelle Bats.

11. Barbastelle bats not only need a mosaic of feeding sites they also require a range of shelter sites. Barbastelle bats shelter in a clearly defined sequence of sites during different times of year and under different weather conditions (Kuhnet et al 2016). Their sheltering requirements are different when sheltering in diurnal roosts compared with when they are rearing young, and different again when hibernating. Due to their highly specialised thermo-regulatory strategies and moisture requirements, barbastelle bats move between different types of shelter according to weather conditions. Hillen et al (2020) tracked **13 members of one colony to 46 different sheltering sites** and found strong inter-seasonal fidelity to roost sites. Some of the required shelter sites are found in ancient and very long-established woodlands, which are now an uncommon habitat in the UK.
12. There is a high frequency of roost switching, even by mothers rearing young. Kuhnet et al (2016), observed mothers to use 11 different sites during one reproductive period. **The number of shelters occupied at any one instant therefore significantly underestimates the number used throughout the whole annual cycle.** Thus it is not possible to assess the impacts of the proposed development on availability of required shelters without an almost continuous record of which sites are occupied by how many bats, for how long, and at which times of year.

13. The composition of groups of individual bats sheltering together does not remain constant (Patriquin 2016). Hillen et al (2020) found that there was a high level of “fission-fusion” behaviours in barbastelle bat sub-groups, resulting in a high turnover rate of sub-group composition. Even during the winter, during spells of warmer weather, individuals regularly move between hibernating sites, leaving from one group and returning to a different group in a different shelter. There is thus throughout the year a continuous turnover in the composition of individuals, as found for a wide range of other species of animal (e.g. Hassall & Tuck 2007, Timbuka 2012). Over a more extended period this process of changing group composition will result in a far higher proportion of the total population using a given shelter site than might be suggested by the proportion of the population that is recorded in that site on any given survey date. **It thus follows that the adverse impact of any disturbance or damage to a particular shelter site on the whole population will be much greater than it would be if group composition remained constant.**
14. The woodlands present in the Lower Wensum Valley provide an exceptionally favourable combination of all the different types of shelter sites required by barbastelle bats. The availability of **this combination of favourable sheltering sites is both very uncommon and declining in this country.** This helps to explain why the largest colony of this rare and declining species in the UK is found in the Lower Wensum Valley.

Why the Combination of Favourable Sheltering and Foraging Sites in the Lower Wensum Valley Makes it such a Nationally Important Site for Barbastelle Bats

15. Barbastelle bats are so rare partly because they have such a unique suite of very specific habitat requirements both for sheltering and feeding (Sierro & Arlettaz 1997, Zeale 2012, De Bruyn et al 2021), a combination which has declined nationally due to changes in land use and agricultural practice. As predicted by Southwood’s (1977) habitat template model and Weins’s (1985) habitat selection model, it is only when each of the separate habitat components are aligned together at appropriate spatial and temporal scales that an organism will select and be able to utilise a habitat. **The preferred route for the NWL crosses a mosaic of this very rare combination of sheltering and feeding habitats.** This explains why the barbastelle bat colony in this locality is the largest in the whole of the UK. Damage to any part of this mosaic of habitats will thus have a serious impact upon a high proportion of the total UK population of this very rare and declining species, as found for other analyses of the impact of roads on biodiversity in relation to ecosystem rarity (Geneletti 2003).

Metapopulation Dynamics Implications

16. The effects of damage to this colony may be even more widespread than at first appears if it forms a metapopulation (Hanski 1998) with other smaller satellite colonies elsewhere in the county. According to metapopulation dynamics theory (Gilpin & Hanski 2012) this central colony in the Lower Wensum Valley may be acting as a “source” colony, helping to maintain other smaller colonies elsewhere in Norfolk, by individuals emigrating to these smaller colonies which are likely to be of more marginal viability due to them occupying less favourable mosaics of habitats. If this is the case, **damage to the central source population could also potentially threaten the continued viability of satellite sink populations** (Krebs 1976, Hanski 1998, Gilpin & Hanski (2012). This is a very

serious risk because the combination of colonies of barbastelle bats in Norfolk represents a high proportion of the whole UK population of barbastelle bats.

Could Mitigation Measures Reduce the Impact of the NWL on Barbastelle Bats?

17. The overall negative effects of major roads on bats is well documented and results from a combination of road kills, traffic disturbance and ruptured connectivity. These deleterious effects having been particularly serious for low flying species including barbastelle bats (Kerth & Melber 2009, Claireux 2016). In other localities adverse effects of developing new roads on other species of bats have been partially mitigated by adopting measures such as building overhead gantries, green bridges, underpasses and bat boxes. Barbastelle bats are as rare as they are because they have such extremely precise and specialised requirements for a combination of different sheltering and feeding sites and commuting routes between them. **It is therefore extremely unlikely that these highly specialised requirements could ever be met by usual mitigation measures deployed for other species.**

For example, it takes centuries for trees to grow old enough to provide the very specific combination of barksheltering sites required by this species. Although barbastelle bats have been recorded flying through underpasses, they prefer to fly over highway developments more than some other species (Kerth & Melber 2009). Barbastelle bats are well known for their exceptionally high fidelity to both their sheltering sites (Hillen et al 2020) and foraging sites both within years and between years (Zeale 2012, De Bruyn et al 2021). **They are thus exceptionally unlikely to change their traditional commuting routes to use gantries, green bridges or underpasses.**

18. Due to the very high level of activity of barbastelle bats in close proximity to the selected route, as revealed by the surveys reported by WSP (2020), the only viable strategy to mitigate the very high risk posed by the NWL to this colony, would therefore be **to switch the proposed route to one of the earlier options located outside the home-range boundary of this super-colony of barbastelle bats.**

Equating the Value of a Species at the National and International Levels with Socio-economic Values at the Local and Regional Levels

19. The currency of local and regional interests is different from the currency of interests at a national and international level making evaluating their relative importance difficult. **However economic theory provides a conceptual framework of values which helps to overcome this problem** (Geneletti 2003, Justus et al 2009).
20. All living organisms have an **intrinsic value**. This takes account of extinction being a permanent loss to the whole planet not just for this, but also for all future, generations (Justus et al 2009).
21. For rare and declining species, another important component to their value is their **rarity value** Courchamp (2006). This is particularly relevant to planning the NWL because barbastelle bats are so rare that they may be at risk of suffering from the “Allee Effect” which could be triggered were there any detrimental effects caused to the Lower Wensum Valley colony by developing the NWL.

The “Allee Effect” (Stephens, et al 1999, Stephens & Sunderland 1999) applies to very rare species, such as the barbastelle bat. When their populations become so low that social interactions break

down, fitness of individuals decreases causing a further decline in the population. This negative feedback cycle exacerbates the decline of a population until it becomes extinct. Barbastelle bats in the Lower Wensum Valley have a complex and delicate social structure so if they are subject to disturbance in any one part of the colony it will impact on the social structure of the whole colony, generating a risk of triggering an Allee Effect leading to local extinction.

22. Species also have a “**passive use value**” (Nunes & van Bergh (2001), because members of society “*passively*” appreciate a species as being part of their living environment. Everyone has a right to be able to enjoy reading about or watching television documentaries about a particular species. Barbastelle bats are members of the only order of flying (as opposed to gliding) mammals. Bats are also the only terrestrial animals that routinely use echo-location when both navigating and feeding. For this combination of reasons members of society as a whole therefore value bats very highly. For a species of bat with a unique ecology, as is the case for barbastelle bats, the combination of these three different sorts of values is exceptionally high at both national and international levels.

Executive Summary of Conclusions.

- A. *The null hypothesis that constructing the NWL along the preferred route will not have a deleterious effect on the largest colony of barbastelle bats in the UK has been tested, using data published by WSP in their Interim Report (2020). **No evidence was found to support this hypothesis.***
- B. *The Interim Report from WSP is based on using a combination of different methods for detecting bats: ground survey, vantage point observations, automatic sound detection and radio telemetry. All the methods revealed a high level of barbastelle bat presence and activity on, or close to, the preferred route, Sound detections at a range of sites adjacent to the preferred route revealed up to 40 passes per night for a individual locations. Roost counts of up to 27 individuals emerging from nine roosts used by radio telemetry tagged individuals. The closest of these roosts was only 440m from the preferred route and all within the 6.5 km average diameter of the home ranges monitored therefore all within the 7km diameter undisturbed buffer zone around roosts of barbastelle bats recommended by Zeale et al (2012) for this “near-threatened and declining” species. **The WSP Interim Report (2020) thus provides important new scientific evidence of high levels of barbastelle bat activity along the “preferred route”.***
- C. *The alternative hypothesis that construction of the NWL along the preferred route, **will result in a high risk of detrimental effects** on this colony of barbastelle bats, is supported by the observations of high levels of activity of this nationally and internationally highly valued species, in close proximity to the preferred route (WSP 2020) .*
- D. *Barbastelle bats have extremely specialised and specific requirements for a range of sheltering sites, combined with a specialised requirement to feed in a mosaic of different foraging habitats (Zeale 2012). **The Lower Wensum Valley has a very rare combination of both favourable sheltering and foraging habitats.***
- E. *It is therefore appropriate to apply the **Precautionary Principle**, at least until after all available data from 2020 surveys commissioned by NCC have been published and fully evaluated. Similar data will be required for other potential routes for the NWL outside the home range boundaries of the uniquely important barbastelle bat ‘super-colony’ in the Lower Wensum Valley.*

References

- Andreas M, Reiter A & Benda P (2012) Prey selection and seasonal diet changes in the western barbastelle bat (*Barbastella barbastellus*) *Acta Chiropterologica* **14**: 81-92
- 19 F, Bas B, Pauwels J, Barré K, Machon N, Allegrini B, Puechmaille SJ, Kerbiriou C (2019) Major roads have important negative effects on insectivorous bat activity *Biological Conservation* **235** 53-62
- Courchamp F, Hall RJ, Signoret L, Bull L, Meinard, Y (2006) Rarity value and species extinction: the anthropogenic Allee effect. *PLoS Biology* **4** e145 <https://doi.org/10.1371/journal.pbio.0040415>
- De Bruyn L, Gyselings R, Kirkpatrick L et al. (2021). Temperature driven hibernation site use in the Western barbastelle *Barbastella barbastellus*. (Schreber, 1774). *Sci Rep* **11**, 1464
- Geneletti D (2003) Biodiversity impact assessment of roads: an approach based on ecosystem rarity. *Environment Impact Assessment Review*. **23**: 343-365
- Fox R (2013) The decline of moths in Great Britain: a review of possible causes. *Insect conservation and biodiversity* **6**: 5-19
- Gilpin, M. & Hanski I (2012) Metapopulation dynamics: empirical and theoretical investigations. *Biological Journal of the Linnean Society*, **42** special issues 1 & 2
- Gottwald J, Appelhans T, Adorf F, Hillen J & Nauss T. (2017) High-resolution MaxEnt modelling of habitat suitability for maternity colonies of the barbastelle bat *Barbastella barbastellus* (Schreber, 1774) in Rhineland-Palatinate, Germany. *Acta Chiropterologica* **19**, No 2 389-398
- Hassall M, Lane S. (2005) Partial feeding preferences and the profitability of winter-feeding sites for brent geese. *Basic and Applied Ecology* **6**. 559-570
- Hassall M & Tuck J M (2007) Sheltering behaviour of terrestrial isopods in grasslands. *Invertebrate Biology* **126**: 46-56
- Hanski I (1998) Metapopulation Dynamics *Nature* **396** 41-49
- Hillen J, Kaster T, Pahle J, Kiefer A, Ortwin E, Griebeler E & Veith M. (2011) Sex-Specific Habitat Selection in an Edge Habitat Specialist, the Western Barbastelle Bat. *Annales Zoologici Fennici*, **48**(3):180-190
- Hillen, Jessica; Kiefer, Andreas & Veith, Michael. (2020) Interannual fidelity to roosting habitat and flight paths by female western barbastelle bats. *Acta Chiropterologica*, **12**, No 1, 187-195
- Justus J, Colyan M, Regan H and McGuire L (2009) Buying into conservation: intrinsic versus instrumental values. *Trends in Ecology and Evolution* **24**: 187 – 191
- Kerth G, Melber M 2009. Species-specific barrier effects of a motorway on the habitat use of two threatened forestliving bat species. *Biological Conservation* **142**: 270–279.
- Krebs (1974) JR Territory and breeding density in great tits *Parus major*. *Ecology* **52**: 2-22
- Kühnert E, Schönblächler C, Arlettaz R & Christe P. (2016) Roost selection and switching in two forest-dwelling bats: implications for forest management. *European Journal of Wildlife Research* **62**, 497–500

Medinas, D., Marques, J.T. & Mira, A. (2013). Assessing road effects on bats: the role of landscape, road features, and bat activity on road-kills. *Ecol Res* **28**, 227–237

Nunes P A L D and van Bergh C J M (2021) Economic valuation of biodiversity: sense or nonsense? *Ecological Economics* **39**: 203 – 222

Patriquin K.J., Ratcliffe J.M. (2016) Should I Stay or Should I Go? Fission–Fusion Dynamics in Bats. In: Ortega J. (eds) *Sociality in Bats*. Springer, Cham. https://doi.org/10.1007/978-3-319-38953-0_4

Rebello H & Jones Gareth. (1997) Ground validation of presence-only modelling with rare species: a case study on barbastelles *Barbastella barbastellus* (Chiroptera: Vespertilionidae) *Acta Oecologica* **18** Issue 2 91-106

Simpson S J and Raubenstein D (2012) *The nature of nutrition: a unifying framework from animal adaptation to human obesity* 239pp Princeton University Press

Sierro A & Arlettaz R.(1997) Barbastelle bats (*Barbastella* spp.) specialize in the predation of moths: implications for foraging tactics and conservation *Acta Oecologia* **18** 91 - 106

Southwood TRE (1977) Habitat the template for ecological strategies. *Journal of Animal Ecology* **46**: 336 - 365

Skerth G & Melber M. (2009) Species-specific barrier effects of a motorway on the habitat use of two threatened forest-living bat species. *Acta Chiropterologica*, **19**. No 2. 270-279

Stephens P A, & Sunderland WJ (1999) Consequences of the Allee effect for behaviour, ecology and conservation. *Trends in Ecology and Evolution* **14**: 401 - 405

Stephens P A, Sunderland W J, & Freckleton R.P. *Oikos*: **87**: 185- 190

Timbuka, C (2012) *The Ecology and Behaviour of the Common hippopotamus, Hippopotamus amphibious L. in Katavi National Park, Tanzania: Responses to Varying Water Resources*. Doctoral thesis, University of East Anglia

Townsend CR, Begon M and Harper JL (2003). *Essentials of Ecology*. 530pp Blackwell.

Wiens J A (1985) Habitat selection in variable environments: shrub- steppe birds. Pp 227 – 251 in Cody, ML (ed) *Habitat selection in birds*. Academic press London, UK

Wild Wings Ecology (2019). Norwich Northern Distributor Road. Post- construction Barbastelle bat Radio-tracking Monitoring Report

WSP (2020) Norwich Western Link Road. Interim bat Survey Report

Zeale MRK, Davidson–Watt I & Jones G (2012) Home range use and habitat selection by barbastelle bats (*Barbastella barbastellus*)- implications for conservation. *J. Mammology* **93** 1110- 1118

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	6 th August 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).

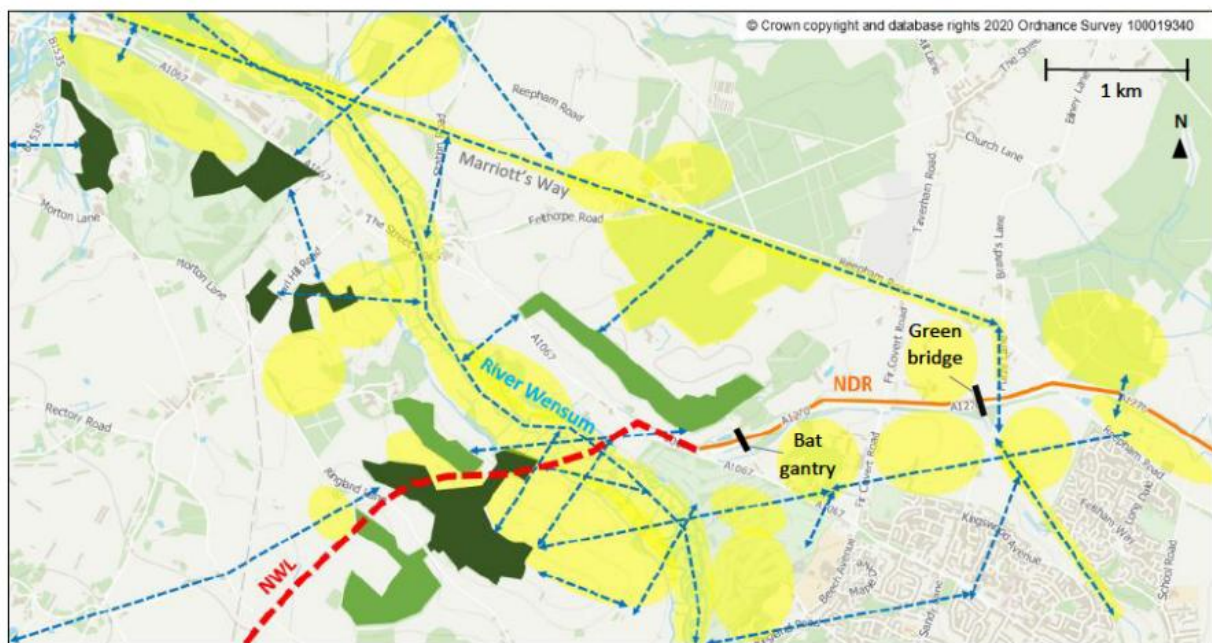


Figure 1. Summary schematic showing the key barbastelle areas which are in close proximity to the proposed NWL (northern section, red dashed line). Maternity colony (also used for foraging) woodlands shown in dark green, other barbastelle roost and key foraging woodlands in light green, foraging areas (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).

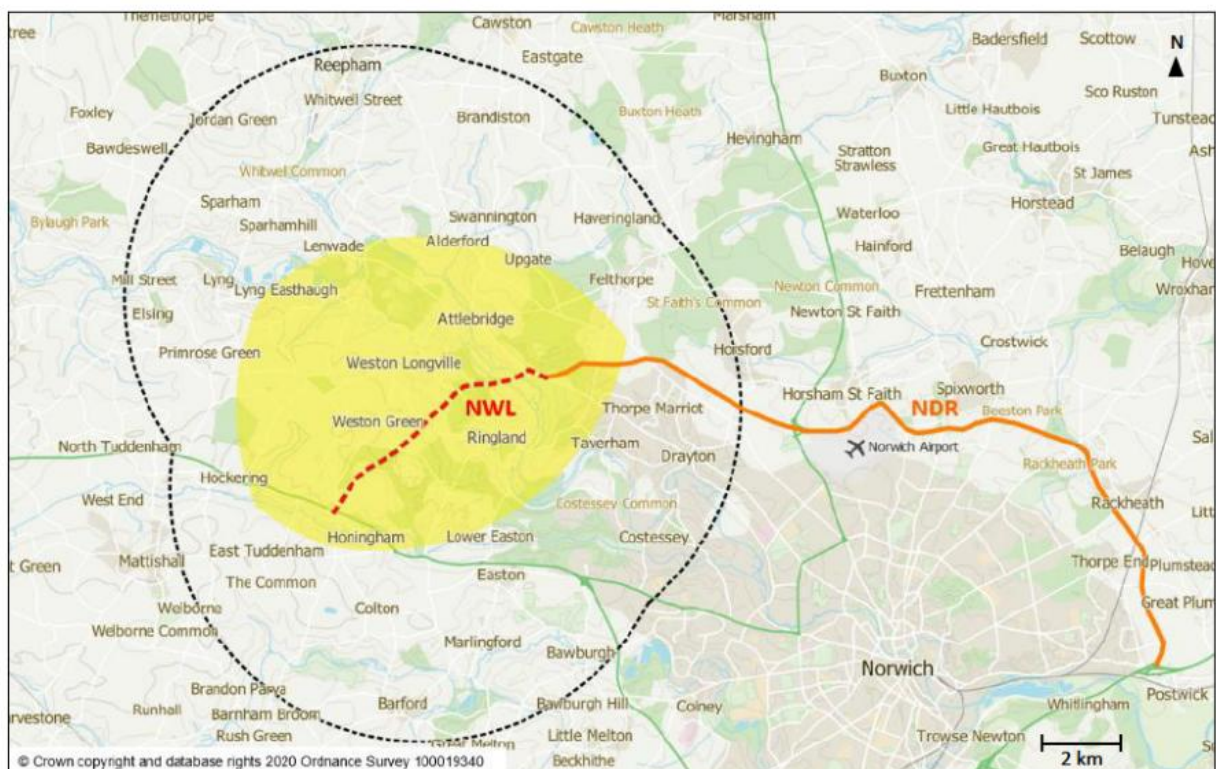


Figure 2. Outline of merged Core Sustenance Zones (black dashed line) around known barbastelle maternity colony woodlands in the vicinity of the proposed NWL, with the 'core of the cores' (the area where all six CSZs overlap) highlighted in yellow. Overlaid on an Ordnance Survey map and with the NDR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