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Policy Workshop

Nature Recovery Networks and Habitat Connectivity in the UK

national highways

Summary report prepared by Patrick McAlary (CSaP Policy Research Coordinator)

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Introduction

The Policy Workshop on Nature Recovery Networks and Habitat Connectivity in the UK was organised by the Centre for Science and Policy (CSaP) in partnership with National Highways.

Background and purpose of the workshop

It is widely recognised that England is one of the most nature-depleted countries in the world, ranking in the bottom 10% globally for biodiversity. To reverse the decline in biodiversity and create a natural environment that is resilient to climate change, it is necessary not just to protect areas of habitat, but also to connect nature. The existing conservation model, however, places emphasis on protecting habitats with connectivity not featuring as prominently on the agenda. With the passing of the Environment Act, and the creation of Local Nature Recovery Strategies, there is a window of opportunity to address this issue and to develop a more holistic approach. Nature networks at a national scale will need to address nature severance created by linear infrastructure, particularly road and rail.

The workshop facilitated a discussion on a national vision of a Strategic Nature Network that provides context for the development of Local Nature Recovery Strategies (LNRSs) by Local Authorities. It also focused on how a business case can be made to deliver improvements to nature connectivity across existing linear infrastructure and how to identify the priority locations to intervene.

The workshop aimed to address the following questions:

Making the case

- What is the case for a Strategic Nature Network?
- What evidence is needed to demonstrate the effectiveness of nature connectivity to avoid biodiversity loss and to increase resilience to a changing climate? How can this evidence be reviewed and evaluated?
- How can the value for money case best be made for nature connectivity?

National vision for a Strategic Nature Network

- What a national vision of a Strategic Nature Network might look like? How can this be aligned, and realised through the delivery of local nature recovery strategies?
- How can we facilitate better collaboration and coordination at the national and local levels?

Learning from best practice

- What international learnings/best practices could we draw on to make progress?
- Can the importance of connectivity be better reflected in the biodiversity metrics used under Biodiversity Net Gain commitments?
- What are the sources of funding to realise this network and what scale of funding would make a meaningful difference?

Prioritising interventions

- What opportunities are presented through repurposing existing structures and assets to increase nature connectivity?
- How do we identify priority locations for addressing nature severance?

Setting the scene

The policy perspective

The opening remarks from a policy expert and an academic expert at the start of the Policy Workshop helped to set the scene and provide framing for the subsequent discussion. The policy expert stated plainly what they considered to be an uncontroversial statement: connectivity matters. Isolated populations are vulnerable to collapse and with a changing climate it is critical for species to be able to migrate and move. The Kunming-Montreal Global Biodiversity Framework talks about protecting habitat, but more importantly it says that this land needs to be well connected. Our national framework—the Nature Recovery Network—talks about recovery of threatened and iconic animal and plant species by providing more diverse and better connected habitats. While other countries have large defragmentation budgets, the UK is quickly falling behind.

The policy expert articulated their hope for a vision for the road network that is sustainable and includes a plan for how to deal with the impact of transport infrastructure on habitat fragmentation. This is something that is currently absent and is a real *desideratum* in policy making. Linear infrastructure is a major cause of habitat fragmentation and it is not simply roads that cause problems, rail infrastructure also needs to be brought into this conversation. The literature is fairly clear: more than 10,000 vehicles on a road per day acts as a hard barrier and stops migration—this means that the road network of around 4,500 miles acts effectively as a security fence that slices up the country for nature. New builds are increasingly taking habitat connectivity into account—an example is the M25 Junction 10 project, which will reconnect two areas of heathland that have been severed for decades with a green bridge. Another example of green bridges being constructed include the A30 and the Lower Thames Crossing. This is good progress, but holistically such examples are few and far between and only happen when a major enhancement project is underway. The policy expert explained that the real challenge is the historic legacy of building the Strategic Road Network over decades that did not take connectivity into account. How can infrastructure be retrofitted to address the severance that has become historically embedded?

Local Nature Recovery Strategies (LNRSs) provide a framework within which to work, but they will not deliver defragmentation—at least not across major linear infrastructure.

Speaking of their own involvement in the board of an LNRS, the expert noted that the map produced for an LNRS eloquently showed how fragmented protected habitats were, it looked like shards of glass dotted across the area. They explained that following this initial identification, there was then a process aimed at identifying other bits of land that might form part of the LNRS, which will draw some more lines around other areas that need to be protected: in itself this process will not create a connected network for nature.

Until recent interventions, there was no thought given to crossings of major infrastructure. This suggests that the existence of major infrastructure is being taken as a barrier that is limiting thinking and ambition for the LNRSs due to concerns around cost. There is no clear proposal for how these barriers may be overcome and as such the focus is turning elsewhere. Metrics and Biodiversity Net Gain (BNG) funding will not deliver crossings and these metrics do not reward increasing connectivity. Even if BNG did, it is unlikely that it would deliver the scale of funding required to deliver costings on major infrastructure interventions. Finding a new funding source is, therefore, an imperative. It was pointed out that there are also inconsistencies in the ways that different LNRSs are being developed and written.

Citing the experience of Sustrans which had been granted £50M through the Millennium Lottery grant to create a national cycle network, the expert cited the importance of a map which was used to connect quieter roads and to address the severance created on busier roads to flesh out this cycle network. They explained how this vision of a national cycle network got the public excited and engaged and this simple idea helped provide a mandate to go out and negotiate the crossings needed to link up a network across busy roads that acted as an unsafe barrier and they encouraged Local Authorities to build into this national spine of connectivity. They suggested there was much to be learned from the development of the national cycle network for a national nature network and advocated for developing an idea of what a strategic national nature network could look like and then creating national corridors that stakeholders can build into. This sets the foundation for an exciting and compelling vision rather than disjointed guerrilla 'looking for scraps' initiative that will have limited impact.

One possible model could be provided by the Netherlands. Its achievements were the product of a long-term strategy and not the product of a sudden surge of activity. The first crossing was established in the 1970s and a national analysis was conducted in 2005 with 178 locations prioritised to create nature crossings of major linear infrastructure. Over the course of 15–20 years, the Dutch have slowly delivered on this vision and addressed almost all of the identified points of severance. It was suggested that there could be something in a consistent relatively affordable scale of funding that facilitates the development of a long-term vision.

The National Highway's Environmental Sustainability Strategy forwards the idea that it can be positive for nature. There is a lot that can be done along the nature corridors, but there is a limit to what can be done without implementing crossings. Corridors are certainly necessary, but so are crossings.

All of this makes an imperative to create a vision for a strategic nature network that stakeholders can work towards. However, this requires a business case for a national defragmentation programme to ensure a sensible use of public money. Important questions include what are the best design practices to deliver nature crossings?

The researcher perspective

A leading expert delivered some insights on nature connectivity from the researcher perspective. They agreed that there are limitations on what can be achieved locally and that there needs to be broader scale planning that mobilises and facilitates multi-actor work. This should appeal to politicians—money aside—as an example of inspiring action of something we are doing where there is a tangible benefit to nature.

There is a large body of available scientific evidence already in circulation. If you type 'roads' into ConservationEvidence.com it provides 237 assessments of 'actions to conserve biodiversity' and quite a lot of these have to do with crossings such as under/overpasses. However, this is only one kind of initiative and a range of other interventions such as providing bat boxes and reducing light and noise pollution as well as reducing speed limits on roads appear. A recent study released last month reviewed 799 studies of sites globally that examined such questions. When it comes to such analysis syntheses there is important work to be done (and much that is being done currently) to unpack the benefits and problems of these research projects.

When thinking about fragmentation, hard barriers like roads and rail tend to dominate, however, it was noted that it is important to think more broadly about what causes fragmentation. For instance, noise and light pollution contribute to fragmentation. Citing experiments on the impact of the sounds of traffic, it was noted that this kind of noise pollution can produce 'phantom roads' where wildlife in the area decreases dramatically just because of the noise of the road. The expert noted that there is growing evidence to suggest that noise may have a bigger impact on fragmentation than linear networks. Any national nature network needs to mitigate these impacts along the areas being joined up. It was noted that design will be key here.

Much focus has been on mammals (perhaps understandable given that one may expect a mammal to try and wander across a piece of transport infrastructure), but there is much less work being done focused on other kinds of organisms. Less attention is paid to plants—

which appear rooted by comparison—in this context. However, plants are important for how a habitat structure is defined for other organisms. It was noted that German researchers give much more focus to plants and what plants should be placed where to help support habitats and species. Very few studies have provided 'before and after' analyses which provide an opportunity to take stock and identify successful (and unsuccessful) interventions. These kinds of studies will help illustrate how infrastructure projects can improve connectivity and biodiversity and participants noted that not enough attention is paid to measuring population dynamics on either side of a piece of linear infrastructure following an intervention. These kinds of studies, taken from medicine originally, are relatively rare in this field there is room for more in the future.

There are difficult questions in terms of costs. With the national debt at a record high, the cost benefit analysis needs to be set out and this can be a difficult sell. There is a huge net positive in terms of human well-being and mental health, however, there are potential costs which are hard to but a number on.

Making the case

Participants discussed how to make a strategic case for nature connectivity, the evidence base, and how the value for money case can be forcefully made.

An ecological case

One participant pointed to the Lawton Review ('Making Space for Nature: A Review of England's Wildlife Sites and Ecological Networks', 2010) which spent a year looking at the evidence for connecting habitats and concluded: 'To make space for nature we need more bigger, better and joined up sites to create a sustainable, resilient and more effective ecological network for England.' This makes the essential case that we need to connect up habitats and this is widely accepted.

One academic expert noted that there is a reasonable literature to draw on for making the ecological case. For instance, they noted that studies show that the success of tunnels designed to connect amphibians is dependent on length, width, what the substrate is, if there is running water, if there is light, if bare metal is used, and if there is a step to access the tunnel. There is a lot of evidence on what works and this provides certain routes forward. Thinking about repurposing existing connectivity infrastructure, it is important to consider what could be redesigned—bearing in mind what we know about what will work—that is relevant for that particular ecological-geographic context. It was noted that there is enough evidence to design a toolkit based on use cases.

The expert cited five key reasons *why* connections are desirable:

1. Species with large home ranges need to be able to move across areas and they are constrained if they are in too small a patch.
2. Some species have seasonal movement (i.e. amphibians that have a breeding home or migration).
3. Small populations tend to go extinct—by connecting species together you can encourage a larger connected population and mitigate against extinction risk.
4. Small populations are prone to inbreeding and may require genetic rescue. This is a greater danger in fragmented populations and can lead to genetic drift and extinction.
5. Metapopulations—a regional group of connected populations of a species—that move around may need access to areas that may not be suitable at the moment but could become so down the line.

Thinking broadly about these reasons, the solution varies a lot between different species and different habitats. It may be important to think about 'what you want to put where'. It is important to think about *in situ* species: which category they fit into, and, thinking about the location, what might a bridge do to solve some of the problems outlined above?

A social and economic case

It was noted by an expert that there is a big move towards rewilding and creating larger habitats and connecting larger habitats. One example is Knepp project: there are plans to connect Knepp to the sea through a horseshoe shape of connected habitats. However, roads cut across these 'connected' habitats. Any attempt to create a large scale connected habitat is stymied by the presence of such linear infrastructure.

Another participant noted that the ecological case, even when backed up by good targets as provided by the Environmental Improvement Plan, meets a political context set by the amount of available money, capacity, and target prioritisation. Traditionally, environmental goals have fallen victim to 'more important' priorities. This means that the ecological case outlined above needs to be bolstered with an economic and social awareness case that justifies what would be a substantial investment of resources in recovering and connecting nature. This will involve unpacking the natural capital dimensions of this—what can be shown as the return on this investment? This step is necessary to transform what will look like to politicians as a set of costs into an essential investment. There are parallels to other state investments such as infrastructure. As the Lawton Review outlines, a national road network would not be constructed by building a mile of road here and there, but this is exactly how nature infrastructure is approached (an unconnected nature reserve here and

another one there). The approach is piecemeal because it lacks an overall strategic case that incorporates the ecological, social, and economic evidence (how can a nature recovery network support people and communities; how can nature recovery relieve the cost burden on the NHS etc.) and addresses questions related to climate change adaptation (how can flooding be reduced; how can food security be bolstered; how is river quality improved etc.). All of this can be pulled together if effort can be made to articulate that economic and social case. This would intersect with a range of initiatives such as Biodiversity Net Gain, Local Nature Recovery Strategies (LNRS), Nutrient Neutrality and it will be difficult to integrate these different approaches. It was noted that a vague idea of a Nature Recovery Network that encompasses a national vision built up from the ground level in the form of LNRSs is starting to emerge, but the economic and social dimension must be represented more firmly in the offer being made to politicians and the public.

In response to one participant asking if the evidence was available to make this social and economic case, another contributor suggested that the evidence already exists. They cited the Dasgupta Review ('The Economics of Biodiversity: The Dasgupta Review', 2021) which was commissioned by the Treasury, the key body that needs to be brought on board. The case for the level of ambition that is required has been made clearly and yet the dial has not moved much further. This participant stated that they did not necessarily have the answers, but they cautioned against an assumption that the reason behind a lack of movement was an insufficient evidence base. The UK has signed up to international commitments—the Kunming-Montreal Global Biodiversity Framework. Target 2 is about restoration, but the UK is starting at a very low point. Even areas being targeted in LNRSs are small and isolated landholdings that are already in poor condition and these require substantial work to actually be restored. The UK is the 185th most nature depleted country on Earth. This problem—which needs to be dealt with—should be approached from an asset perspective. According to The Finance Gap for UK Nature (2021) by the Green Finance Institute, the financial gap to meet the UK's nature-related outcomes is between £44bn and £97bn over the next ten years with a central estimate of £56bn.

This cost, it was argued, will simply not be paid by government. The Department for Environment, Food & Rural Affairs (Defra) have set a goal to grow annual private investment flows to nature to at least £500m a year by 2027 in England, raising to more than £1bn a year by 2030. The participant emphasised that private sector investment is key and it is important that this is incorporated into the much larger strategic network geared towards connectivity that is built on genuine ambition of restoring *ecosystems* (the focus cannot simply be on landscapes, certainly not 'habitats', and it cannot rest on species, they argued). While the participant agreed with the ecological arguments set out above, they suggested that any strategy cannot be based on 'species' and pollinators because these are going to look completely different in the future. They stated that most of the things within the UK's nature reserves at the moment are functionally dead because the pollinators have already

shifted—they can fly. Everything else needs to be moving ten meters a day northward because of the extent of climate change that is now upon us. This challenge demands a much broader strategic perspective and key questions relate to how emotive levers that will make key decision makers and private sector actors work together are identified and mobilised to ensure that this agenda is properly funded and has adequate commitments from potential stakeholders.

Lack of evidence is not necessarily the problem

Participants agreed that there was a lot of evidence for why nature connectivity was important and beneficial, however, the reason why connectivity initiatives should be undertaken is yet to be successfully articulated. As one participant put it: "It's not really about the evidence, it's about the common-sense reason as to why we are going to go to all this trouble." The other major blocker that is impeding progress on this issue is the absence of forums and networks that bring stakeholders together. Contributors observed that the Policy Workshop had provided an opportunity to bring together stakeholders that had not yet crossed paths and facilitated a good conversation - this is something that needs to happen more regularly.

It was also noted that the tools we have to address these issues present a further problem. Many of the tools operating were designed a long time ago and developed haphazardly in a piecemeal way to do a job that they were not designed for. They were designed for specific purposes (protecting a particular type of dormouse or a specific meadow etc.), this is a very different set of uses for nature recovery at scale.

Ultimately, there are a host of factors holding back progress, but none of these can really be described as a lack of evidence. This is not to decry evidence or evidence generation, more evidence is always good, however, if the focus is locked on to the perception that there is a paucity of evidence, then other important impediments may be missed or ignored.

Overlaying priorities and identifying stakeholders to make the case

Another contributor built on this, arguing that any case for a strategic nature network is about overlaying these different priorities: where are the priority ecosystems; where can the balance of the cost-benefit analysis can be altered to produce multiple benefits related to climate change mitigation and human well-being? How can these layers be layered to pinpoint priorities? This is where strategic thinking is required, otherwise it will simply be a case of stakeholders choosing their own personal pet projects—the hotspots that can provide multiple benefits need to be identified as targets cannot be met if only one outcome is achieved for one piece of land. In terms of making the case, one participant shared their enthusiasm for the idea of layering data as a means of identifying investment

opportunities. They cited an example where a public utilities company attempted to identify where it should invest not only to support nature recovery, but to prevent river pollution, to improve public access, and to mitigate flood risks, and when they had mapped and layered these *desiderata* it became clear where the areas for investment should be. This, the participant explained, highlights the potential of what can be down with sophisticated data mapping and good data management. Participants emphasised the importance of utilising visualisation to help articulate vision and make decisions.

Thinking about helpful synergies, it was asked if there were benefits of mixing crossings for nature and crossings for people. Participants noted that the benefits were mixed and context specific. In some cases, such as in France where there are 1 million hunters, the development of multi-purpose passages may simply allow people to access prey more easily. However, in the Netherlands there are currently pedestrian and cycle paths that exist side-by-side nature crossings on the same structure (but made wider). This prompted participants to suggest that a deeper conversation is needed about what is necessary and what works for the associated costs. Moreover, how can the best be made of infrastructure already in place: what is available and what can be repurposed? It is not a case that there are currently no crossings in the network, there are at least *some* and these should factor into a wider strategy aimed at bolstering nature connectivity.

This brought the conversation back to the point above about what is wanted and where. There may be opportunities to use existing infrastructure to create connections, but if the ecosystem is failing then this will not have many positive impacts. If the point of departure is what kinds of species are crossing where now, the baseline assumptions are incorrect, and more effort needs to be put in to looking forward to 2030 and beyond. The priority area for crossings are keystone species and it is important to think about engineering habitats on either side of linear infrastructure to make it more biodiverse by abundance and receptive to the new species that will be moving in. Ultimately, a functioning ecosystem needs to be governed by natural processes and it is important that these natural processes are enabled through crossing points.

Participants generally agreed that it cannot be the 'usual suspects' (such as environmentalists, environmental agencies, and departments with an environmental remit like Defra) that try to push this forward and illicit support from the Treasury and to stand up against stakeholder groups that are likely to oppose measures when we enter landscape and planning territory. It was also noted that policy makers on the transport side are in a more comfortable place with politicians for talking about climate resilience issues and if there is an overlap between a strategic nature network and climate resilience issues related to infrastructure this creates an obvious point of entry for the likes of the Department for Transport (DfT).

On the point about making a business case, one contributor suggested that it could come from voices outside of conservation and academia: from engineers or from those concerned with safety that are involved in building and maintaining transport networks. Challenges being faced by those who maintain roads and rail are a direct consequence of climate change such as increased obstructions on transport arteries (i.e. from trees felled during storms) or from greater flood risks.

A route forward identified by participants is to bring the engineers, architects, and other actors in building and planning into dialogue with the ecologists at the beginning of a project to co-design nature recovery infrastructure in the design phase rather than in the middle of or at the end of a project, when it becomes clear that there will be severe adverse impacts on ecosystems and habitats. There will be benefits not only for nature but for costs also, however, the forums and infrastructure for these conversations does not currently exist.

The recent round of storms that started in September have contributed to nearly 150,000 minutes' worth of delay on the train network in Britain. Each minute costs a minimum of £100 rising to £400 for trains leaving Euston. Therefore, extreme weather events are having a significant financial cost on the train network. However, one of the ways to stop flooding disruption is by investing in nature-based solutions. It was noted that opportunities for stakeholders responsible for maintaining transport infrastructure to implement such solutions are made more difficult by jurisdiction issues. As one such stakeholder explained, the ability of bodies like Network Rail to implement these nature-based interventions is restrained by the fact that it needs to take place 'on the other side of the fence', rather than in the catchment area of the railway.

Is there a way of demonstrating to railway engineers that the railway does not need to be rebuilt every time it washes away (which brings heavy disruption to an area), but that the water can be slowed down elsewhere in the catchment area? This could create a case for spending money elsewhere instead of on hard infrastructure associated with the railway itself. This helps create an environment where biodiversity and connectivity can fit into a business case where the nature-based approach does not present as a nuisance to infrastructure developers and operators, but as a necessary component of these operations. When asked if the evidence exists to back up such a strategy, it was noted that there is substantial anecdotal evidence, but also academic literature on, for instance, the impact of woodland planting on flooding.

A policy-orientated contributor commented on Biodiversity Net Gain. They noted that because it was measured and because their projects were targeted on biodiversity—that is, engineers and ecologists sat down together at the outset of the project—the project lost around 2,000 *fewer* biodiversity units through construction than expected. This was a product of early collaboration which presents a hopeful message if these kinds of

partnerships can be set up and embedded.

Best practice and developing a case for nature connectivity

The positive example of the Netherlands was a recurrent theme in the Policy Workshop. One participant asked how the Dutch constructed their business case for a connected nature network. Did they base their pitch on an ecological case or did they also present an economic and social case? It was explained that they did not try to monetise the benefits; their approach was instead to present a national programme (rather than focus on individual structures and interventions) that was necessary to achieve their nature objectives as a country.

One participant drew a comparison with how the UK attempted to value carbon. They noted that hundreds of papers were produced outlining debates related to damage curves, discount rates and the rest, however, there was never going to be one consensus on the value of carbon. The approach, therefore, was to present the scientific consensus that this was a necessary endeavour and a carbon value that could achieve the necessary reductions was subsequently calculated. This process could be applied to the UK's nature objectives, where the level of connectivity required to meet objectives and obligations is determined, and this sets the benchmark for delivery.

One policy maker concurred and explained that any case for nature connectivity will come up against the current processes for constructing business cases for transport. They noted that, as it stands, we are very far away from overcoming this threshold and making a viable economic case that will hold water. The next ten years (ten years that we do not have) could easily be spent attempting to gather the necessary evidence base to make the case. It was suggested that there needs to be a reframing conversation between the Department for Transport, the Department for Environment, Food & Rural Affairs, and the Treasury. It was noted that if there was widespread agreement that the evidence shows that fragmentation caused by linear infrastructure is a significant barrier to the UK's nature objectives then, given the legal imperatives in place by virtue of the UK's international commitments, this provides a framing for a strategic plan. By contrast, it was agreed that traditional approaches to providing a strategic framework by modelling congestion costs and demonstrating potential value would not be appropriate. There is a lot of evidence out there, it all depends on how it is marshalled as a set of arguments, but it was noted that unless relevant stakeholders can put evidence together and articulate it, there is little prospect of moving forward.

Involvement of private finance

One contributor asked what role should private finance have—what is the case for private

individuals and organisations to invest in nature connectivity? Participants also questioned if conversations had been initiated with the UK Infrastructure Bank. Another participant responded by explaining that they had been involved in group discussions including individuals from finance backgrounds who were ready to discuss the service pitch as they had arrived at the same conclusion from multiple perspectives. Biodiversity is becoming increasingly prevalent within this space; see, for instance, the UK Infrastructure Bank's Annual Report published in October 2023 which mentions nature restoration and biodiversity. It was noted that there are indications that this could become a more substantive chapter in the next version. The contributor recommended identifying individuals within key agencies who are interested in such issues to act as a kind of mechanism for building some momentum.

The participant put forward a case for articulating the wider strategy (30 by 30 for land and sea or whatever framing is decided upon) rather than solely focussing on defragmentation. This is something, they suggested, that the private sector will put money into, and they emphasised the importance of the insurance industry as a potential stakeholder. This is the industry that understands risk and insurance stakeholders are rightly worried about the implications of ecological breakdown. Bits of the finance industry could move quite quickly if they are given the right devices to work with, but the main thing that is missing is scale. The minimum project size is £25M and, in general, non-aggregated conservation bodies and land owner schemes cannot offer the minimum scale that finance stakeholders require for investment meaning that, at the moment, it is simply not going to happen. There is a major risk that the wall of money allegedly available from the finance sector will bypass the UK entirely unless it puts its marker down promptly in terms of the level of ambition.

Another participant chimed in by noting that in addition to scale, issues around confidence and the extent to which risk can be managed could facilitate the involvement of Government agencies who can verify that such investment is impactful and is not simply a greenwash. It was noted that the National Infrastructure Commission are creating their strategic plans and want to align with environmental strategies when they are, for instance, digging up electric cables. This could provide a unique opportunity to involve another relevant voice as we move forwards.

Another contributor noted that 'investable' options emerge from something that can be sold afterwards. While markets are being created around biodiversity units, nutrient credits, and potentially carbon credits, none of these are going to generate the kind of return from building a crossing of major infrastructure. Such connections may enable bridging the landing spots in the wider network, but, ultimately, the money will go to the interventions that will generate the most credits for the level of investment and the fact remains that, at the moment, crossings will generate very few credits and thus will be the last thing people would want to invest in.

Another expert returned to the point about creating a product to attract investment—something that is particularly difficult for connecting habitats across linear infrastructure. This individual noted that there *are* opportunities to create 'investable options' even with roads. They highlighted private roads as one example. Another route for attracting private investment is to spread the regulated cost of capital and the market cost of capital, something done fairly well in the UK. This benefits investors to these infrastructure assets.

This expert noted that it is not the financial risk that detracts investors in green finance from the UK, it is rather the policy risk. There is a lack of consistency in the UK's approach which makes it more difficult for investors to put money into this space. In terms of making the financial case for nature connectivity, this expert emphasised the importance of gathering spatially targeted evidence. There is no need to rehash the climate / biodiversity arguments, the evidence is clear in these cases. Nonetheless, when it comes to making decisions about the road layout, the use of materials in construction, and land use values, the potential trade-offs are extremely important. It was noted that the UK is the best in the world at delivering the kinds of economic evaluation models that can answer these kinds of key questions. The participant explained that the best team working on these economic evaluation models is based at the University of Exeter and they can build in ecological models as well. The primary sources of value that we will deduce will not necessarily be biodiversity driven, but co-benefits of doing the right thing for biodiversity (congestion, human health, and recreation etc.).

Creating a national vision

What is a 'vision' and why is it needed

It was noted that a national vision provided an important context to allocate resources and money and to provide a positive goal to build towards. It was explained that this vision would help provide much needed direction and help fit individual investments into the wider whole. The vision should be long-term and does not need to be too closely defined. A policy participant cited an example where they had been presented a business case for a redundant bridge on the A120 that, for £200,000, could be turned into a green bridge. The question they asked is how they are to decide if this is worth investing this money on this project? It is certainly cheaper than building a new green bridge, but where is the statement of national policy that defragmentation matters? Where is the context within which they can set this project at the moment? It was noted that the vision is not just about nature, but encapsulates a much broader set of interests that encompasses economy and society and this point was reflected across the conservation that took place in the Policy Workshop. One participant emphasised the need for a national strategy given the limited resource available

to spend nationally. The plethora of local initiatives will mean that a range of priority areas will emerge which will far outstrip any resource available. Therefore, it is important that there is a broad view of priority areas to direct investment.

Participants agreed that there was a strategic case to be made, although there was disagreement over whether this should be 'big picture' or 'granular'. The bigger picture is about biodiversity, climate change, and access to nature, however, there are uncertainties about what works at a local level and fears about a lack of evaluation. There is value in a locally built up plan, but unless that national picture exists it is very difficult to join up a plethora of smaller scale initiatives and government departments cannot be expected to have the capacity to deal with hundreds of Local Authorities and a number of different plans to work out where they should invest and to stack up a very difficult argument to convince the Treasury.

A participating policy maker noted that one way forward is to have a vision of what a strategic nature network might look like as this would allow policy makers and other stakeholders to begin to think about a planning and investment perspective and to map that and layer it onto areas where issues around flooding and other climate related issues are expected to occur. Participants asked for information on where there are ten-year enhancement plans that map on to an opportunity for investment and where are the areas where there are currently no development plans in place, but where there is capacity for impact? This is where the case for an investment strategy that would enable the issue of defragmentation to be addressed emerges from.

One policy contributor queried what a national vision or strategy actually meant, what would the result be, and how would it be realised? They suggested that the key was governance (i.e. who decides where things go) and they cautioned against making the 'vision' an enemy of practical steps. They argued that that LNRSs help create a cyclical process. The idea is to prepare the strategy according to the framework set out following which there is a period of delivery and then there is a period of taking stock in three to ten years (ideally every five years or so) and the strategy is updated accordingly. This presents a situation which progresses towards a vision. This approach is based on gradual steps and does not necessitate alarming ministers with figures such as a 30% decrease in land available for agricultural production in England, which could illicit kneejerk reactions from decision makers.

In response to the question about what the purpose of a national nature recovery vision is, one participant emphasised the financial context. They argued that it was vital to articulate the vision to attract financial investment at scale at a rate that the LNRSs do not provide (see above). They noted that both top-down and bottom-up approaches are needed to create a happy medium scale that will facilitate investment. The national vision is key

because it provides direction.

The same participant made a comparison to moves made by the Treasury to deliver deregulated investment zones under the Liz Truss premiership and asked why this is something that cannot be pursued for biodiversity initiatives like the defragmentation agenda. They argued that there is enough investment potential and there are investors waiting to get involved if it can be delivered at a necessary scale. They noted that there is capability to identify key crossing points where there will be willing landowners who can develop projects that achieve at least the minimum value required for investors.

How could a vision be articulated?

Thinking about evidence and its role in shaping a national vision, another policy participant highlighted a piece of work where a stakeholder identified the 50 most dangerous roads in England and that this was something that really struck ministers. Despite this, there was little appetite for verifying the list and rather than spending two years assessing if the identifications were correct, they seized the moment and directed funding towards solving the issue. In this case, the decision makers were willing to take a risk and assume that the list likely captured a good number of dangerous roads and this was enough to act. The point was made to emphasise that the evidence base does not need to be perfect, but it needs to be *usable* for policy makers and decision makers. As another participant put it, rather than developing a broad national vision, it is important to identify what is the minimum needed for policy makers and engineers to identify a coherent case for action in the face of a policy and legal imperative. The vision does not need to solve the whole problem, but it must be part of the political narrative towards solving a problem.

A policy contributor noted that if it takes five years to determine the shape of a strategic nature network, it will be fifteen years before crossings emerge, whereas if the vision can be outlined within a year—a year that will see a general election—then this would provide a real route forward for embedding connectivity infrastructure as part of road and rail infrastructure within five years. The key, they argued, is about framing the problem(s) that require solution and identifying what is achievable within what timeframe.

Prioritisation

One recurrent issue identified by participants is that when stakeholders try to push for action around nature recovery, they quickly run into issues about prioritisation. There are arguments that the focus should instead be on food security, housing availability, or some other key issue. This should invite thought about how to develop a more strategic approach in which nature is not competing, but is part of the same development process: can a point be reached where nature recovery and planning are the same thing? LNRSs are important,

but is there is a need for a step to create an integrated process with DfT and DLUHC whereby a land use planning framework is developed? The 'exam question' for such a framework is what is the most rationale use of the 150,000 km^2 of England with 57 million people needing to live out of it for all of our requirements? That this question is not asked sets the groundwork for oppositional, and ultimately stagnating, arguments about resource allocation. It was argued that it would be good to locate the nature recovery vision within a wider framework of how land should be used in England. Defra have looked at this in the context of their Land Use Framework, however, it will have much greater impact and utility if DfT and DLUHC and other key departments are involved. This returns to a theme already explored: avoiding potential conflicts by anticipating them and looping relevant stakeholders into the discussion at the outset. What is more, this participant argued that it could be transformative if the ask for such a framework or template was not coming from Defra, but from DfT/DLUHC as other departments involved in land use, reiterating calls by participants to involve non-traditional voices and stakeholders in making the cases for defragmentation and nature generally. If calls for such innovations come from what may be termed 'non-environmental stakeholders', then it could create added momentum. Participants discussed providing a united front with conservation and other stakeholders (infrastructure etc.) with joint branding when pursuing attempts to engage with important mobilisers like the Treasury. It was noted that initial requests could come from a political or infrastructure centre such as the National Infrastructure Commission and then the process could be passed to another body like National England which could provide a convening function. An initial statement for the vision could include stakeholders such as the Crown Estates, the National Trust, and Church Commissioners.

International comparisons

The example of the Netherlands has been mentioned several times already. However, one academic expert drew comparison to a relevant state-funded project in California which is focused specifically on retrofitting existing structures (especially drainage covers) and noted that they are developing a toolkit for how to work with specific structures and what else needs to be implemented to make this work.

Highlighting further international comparisons, one participant noted that Germany, a federal country, have approached their defragmentation programme by delineating land units; each of these have a broad strategy and parameters and they each needed to create their own defragmentation programme which would then be joined up and amalgamated. They noted that the interesting aspect of this approach wasn't the specific (i.e. 'how do we cross the road'), but rather how large-scale ecosystem connectivity is achieved through habitat management. They argued this broad approach is the way forward if we want to encourage connectivity in a robust way for the future.

An academic expert noted that just as in the case of the Netherlands, the UK needs to develop a long-term plan and to stick to it. It is still important, however, to identify the species and habitats that would benefit from bridges, underpasses or other connectivity infrastructure and to think about where they would best be located. One can imagine mapping that seeks to identify the blocks of habitats which bridges would help connect with much bigger habitat blocks and identify areas which contain sensitive species where the presence of a bridge would provide important support. From this the positive gain for establishing a bridge at particular sites can be calculated and the gain per pound for having a cheaper bridge in a less than ideal location versus a more expensive project that places a bridge in an ideal location. This is a simple economic argument that could help justify action.

Top-down versus bottom-up?

Policy contributors were asked about the appetite for creating a top-down model rather than allowing a bottom-up model to emerge from the LNRSs. One policy participant noted that they wanted to be able to advise ministers in any incoming government about some choices and bold ambitions that might look and feel different on a roads investment strategy. They noted that creating something 'new' and 'different' will be an imperative for any incoming government. The question remains: what will be part of this vision to be recommended to ministers? In their opinion, connectivity and a defragmentation agenda could be part of this vision, but there will be little appetite if this is a prolonged project. Therefore, another question is: how quickly could steps be taken to manifest this vision? Returning to a previous point about a potential multi-departmental Land Use Framework, this participant voiced their support, but acknowledged that this was a long-term project and asked what immediate steps could be taken incrementally to get on to that path as ten years is too long to build consensus and develop the end product.

A participant discussed the Land Use Framework developed by Defra and noted that there was difficulty articulating and answering basic questions: what is it; who is it for; what should it do differently? This is because it is too big and it *feels* top-down and prescriptive and there are political concerns that it could jeopardise the rural vote as an election looms. They noted that issues like self-sufficiency and food security were rising up the agenda and that the response of ministers being briefed on strategic nature networks or environmental targets in general is surprise about the amount of land that needed to be removed from agricultural production.

This participant argued that key to any vision are the LNRSs. The idea behind these is that starting from what is currently protected, we identify what is being added locally through system protections, and then a decision-making process is developed for identifying priority areas. LNRSs are underpinned by regulations and legislation meaning there is statutory guidance. While it is locally led, however, Natural England is represented and working in

each of the 48 LNRSs. The question the contributor posed was, from a national perspective, what is this *not* going to deliver for a vision for nature recovery that needs to be adjusted? As the system is currently designed, there is scope for adjustments to be made. They argued the LNRSs are locally led, but with national intention and this allows for local contexts to be taken into account—nature recovery in Cornwall will look very different than nature recovery in London. *If* it is not looking like each LNRS will add up to the national picture, there are 12–18 months to fix this and this participant argued that this is where energy should be focused. They urged National Highways and Network Rail to get involved and to ask questions about where to invest and where to set priorities. However, they argued that any vision or strategy must come from the idea of 'place' and it must be bottom-up. The participant emphasised the importance of defining what a strategic nature network actually is and argued that it must be more than a model dreamed up by people sitting around a table: it required local engagement and a governance and decision-making framework around it, and it is important that it also had delivery in mind. The intention behind the LNRSs is that they are designed to be as close to the planning system as possible and the Levelling Up and Regeneration Act has been amended to make sure that all levels of planning take the LNRSs into account. The tensions are being worked out, however, the participant noted that time is required (12 months or so) to ensure the 48 LNRSs are up and running so that the bottom-up system can emerge.

In response, another participant noted that while LNRSs are a useful framework within which to work, pursuing a purely bottom-up process does not promote cross boundary regional-national thinking and it does not support outcomes such as the crossings of major infrastructure. The result is not a connected network but many shards of protected habitat. A policy participant noted that it would be possible to identify the top 100–150 crossing points of major infrastructure quite quickly and this could be done through a mixture of bottom-up intelligence (engaging with the LNRS authors to identify crossings that would unlock opportunities for the local area) and by bringing in other synergies such as road safety (where are collisions happening) and other perspectives besides. This could be an outcome that could be ready for any new government. However, the vision piece would remain a *desideratum* and without the national context the rationale for identifying the priority crossing points falls away.

Another participant, commenting on the bottom-up LNRS approach, noted that it amounts to putting a whole new set of layering on an already convoluted planning system that will stop this agenda and put further barriers in the way. This, therefore, will fail to provide an enabling framework and bring dialogue into an oppositional space rather than promote an open attempt to identify opportunities for investment over the next decade. Ultimately, their view was the local bottom-up approach provides barriers to getting things done. They advocated for a 'positive enabling vision' that can be sold to politicians and the public. They noted that the UK is the worst in Europe when it comes to infrastructure delivery and there

needs to be a better way of proceeding that delivers environmental outcomes and benefits.

Another contributor reiterated that integrated processes at the broad level were the key. They reiterated earlier calls for the creation of processes where infrastructure and housing and nature recovery were designed together rather than in parallel. It was argued that the LNRSs are exactly designed to achieve this more strategic and joined-up approach to planning to bring out the priorities for things like nature recovery.

One participant pushed back on this, arguing that there was a golden window to get this right and as it stands, the limitations being placed through the way the system is being applied at the local nature recovery planning level means that the bottom-up solution being presented is minimalist, restrictive, and unambitious. They contended that there have been various iterations of these types of plans over the years and they have consistently failed to achieve results. They made the case that conservation in its current form does not work and they argued for a new investment model that facilitated a far more ambitious approach. The 30 by 30 target is around the corner and there is a real imperative for a strategy that is a lot more substantive and takes into account other stakeholders. The contributor made it clear that the need for action extended even beyond wildlife, pointing out that the UK nearly breached 1.5 °C last year. The contributor called for a realistic approach and argued that LNRSs in their current form will not solve the issues. It was remarked upon that the conversation taking place at the Policy Workshop was breaking important ground.

There was a tension that underwrote the discussion about crafting a vision of a 'strategic nature network' that takes time versus getting started with initiatives as soon as possible. One contributor advocated for the creation of layered map that takes into account linear infrastructure networks and various development interests to illustrate opportunities and to have this ready for any incoming government. This—they said— would help make the idea tangible.

Presenting alternatives to ministers

A policy participant presented two stark choices for bringing the defragmentation agenda forwards. One was a defragmentation agenda that could be presented to a minister as part of a wider case for sustainable roads and investment. This helps shift away from a negative narrative on linear transport infrastructure. If there was something that could be used to map against departmental investment property, then this could allow for the presentation of a list of top fifty interventions that would deliver for value and for nature and this is something that can be delivered within three years as some of the work may have already started. Alternatively, a fund could be set up in which local bodies and Local Authorities—on the basis of local strategies—could bid for funding, after which Government would make an assessment. The latter option, they suggested, would take twice as long and would encourage opt-in from a select group of people. They reiterated that they did not want a

‘vision’ that could answer every question from regulation to implementation, rather, they were interested in broad brush priorities that are spatially grounded to direct investment.

Participants engaged in a discussion on what could be achievable for a new government minister within a year of taking up office. One potential initiative included developing a pilot region for connectivity. Participants highlighted the importance of piloting in general, with embedded processes of evaluation from the outset. One cited example was related to bat bridges. Another was identifying the top fifty sites for crossings bringing together a broad church of academic, policy, and third sector stakeholders.