


HS2: The case for a greener vision

Reference report - Ideas for large-scale nature restoration along the HS2 proposed route



A red kite is shown in flight against a plain white background. The bird's wings are fully extended, revealing the intricate patterns and colors of its feathers, including shades of brown, tan, and white. The bird's head is turned slightly to the right, and its sharp beak is visible. The overall composition is clean and focused on the bird's form and movement.

If it goes ahead, HS2 would be England's biggest infrastructure project in modern times – so we believe it should be England's biggest nature restoration project too.

But the current proposals for environmental mitigation and protection fall short and we cannot support them.

Red kite - a familiar sight over stretches of the HS2 proposed route.

HS2: The case for a greener vision

1. Summary

The proposed new High Speed rail link from London to Manchester and Leeds (via Birmingham) - HS2 - presents a challenge to organisations like The Wildlife Trusts. Our core focus is protecting wildlife, restoring ecosystems and connecting people with nature. We seek to reduce the environmental impact of new development but we are generally supportive of initiatives that help with a transition to a low carbon economy. We have to be. Climate change is one of the biggest challenges facing our wildlife and habitats, as well as ourselves. We must make our fragmented landscapes more connected, with linked areas of habitat so that plants and animals can move and adapt in response to rising temperatures.



The existing Channel Tunnel - London HS1 line. HS2 proposes to connect London to the north via a High Speed rail link to Manchester and Leeds.

Our focus is on the environmental impact of the proposed route but independent analyses of the business case for Phase 1 (London – Birmingham) continue to indicate that the direct economic benefits of HS2 are weak. HS2 bisects communities and, as a high speed line, its main benefit to people is currently restricted to communities and businesses near the few stations on the route. HS2 also puts constraints on large-scale plans to restore and reconnect habitats unless ecological connectivity is designed into the project in a much more ambitious way, for example through the provision of numerous wild green bridges, tunnels and corridors of new habitat. But at the moment valuable wildlife sites will be destroyed, thousands of hectares of land without conservation designation will be permanently lost and ecosystems fragmented.

In response The Wildlife Trusts have been working alongside a range of groups either opposing the current proposals or trying to radically improve them.

More recently we have developed a greener vision for HS2, aiming to reframe HS2 as a significant one-off opportunity to put nature and wildness back into a part of the country where we sorely need it – lowland England. This document provides the background and methodology for our vision, which is more succinctly captured in a separate document available here: www.wildlifetrusts.org/HS2.

We are in discussion with other nature and countryside groups and envisage that any petitions to the specially-formed Select Committee from wildlife and countryside groups would not conflict with what we are proposing and could together form a much bigger change of direction for HS2's environmental vision. It is important that environmental compensation does not come at the expense of other compensation payments for people living along the route - a separate transparent budget for environmental mitigation and compensation should be provided by HS2. Our proposals would also work alongside screening and landscaping designed to reduce the visual and noise impact of HS2, which is vitally important for local residents.



Our vision - a wild green ribbon from London to the north

Our vision is for a ribbon of wildlife-rich landscape designed around HS2 and connected via green bridges (and potentially tunnels) to enable habitats and species to thrive and to improve access to nature for people. There are places along the route where areas of woodland, wetland, and grassland can be created to increase the size, or improve the quality, of existing habitat patches or re-establish links between them by creating new areas of habitat. This would create a strip of wild landscape for wildlife and people, stretching from London to Birmingham and north to Leeds and Manchester in Phase 2. Our plans are focussed around a 1km buffer strip either side of the corridor where the tracks are laid. Our provisional habitat opportunity mapping has identified around 15,000 hectares of new habitat that could help to more than replace hectares lost, ensuring that HS2 truly delivers a 'net gain' for wildlife.

Our approach can be broadly summarised as combining habitat creation, for example creating new areas of woodland and grassland, with letting nature regenerate and naturally colonise areas of land along the line (a sort of 'rewilding' approach). This would provide a large-scale and high profile demonstration of the Government recognising the value of nature and its benefits for people. This green corridor could also reconnect local communities currently bisected by the proposed line via an ambitious programme of green bridges, pathways and cycle tracks ('Low Speed 2'), helping to spread the benefits of HS2 to all communities along the route rather than just those located near the few stations HS2 will serve.

If a large-scale infrastructure project like HS2 is to go ahead, it must have a large-scale commitment to the communities, landscapes and wildlife that it fragments.

Crucially, our work shows that significant investment in green infrastructure, habitat restoration and creation as part of HS2 is affordable and cost-effective.



New woods, meadows and lakes would provide local people with access to nature on their doorstep.

How we came up with our proposal

To develop our vision for a greener HS2 we held a series of workshops to identify where habitat creation opportunities existed along the route (see Appendix 1 for full methodology). These were attended by conservationists from Wildlife Trusts along the Phase 1 and 2 routes. Subsequent mapping and planning then identified the areas along the line where the opportunity for nature restoration is greatest and most cost-effective to devise a strategic corridor (or stepping stones) of habitat that would reconnect fragmented habitats and strengthen local ecological networks. By building habitat recreation or enhancement into the HS2 construction programme we could ensure that lost sites and habitats are adequately mitigated for and that HS2 enhances rather than destroys ecological connectivity.

To demonstrate the practicability of our proposals we commissioned researchers at Newcastle University to undertake an independent Cost Benefit Analysis (see p14). This concluded that, relative to the scale of HS2, restoring ecological connectivity, as we proposed, is affordable. HS2 is a vastly expensive project with a current budget of £42.6bn. An amount has already been allocated for HS2 Ltd's unambitious environmental mitigation, but we believe this money could achieve so much more – both for nature and for communities along the line. We estimate that our current proposals would use less than 1% or less of the total HS2 budget plus an amount for ongoing maintenance and management (see p14).

Although our proposal focuses on restoring nature along a corridor of land along the Proposed Route, we believe there are also wider opportunities in which habitat recreation or enhancement undertaken as part of the HS2 programme could be linked to effort by partners to build ecological connectivity at a larger scale beyond the tracks. Partners could include farmers, land managers, statutory agencies such as Natural England and the Environment Agency, Local Authorities and councils, Friends Of and local residents and community groups and nature conservation charities. We have undertaken initial habitat opportunity mapping beyond the work presented here that could be used to develop this.



Looking at the impact of HS2 - one of the habitat opportunity mapping workshops.

2. Ecological impact of HS2

Ecologically, HS2 will damage habitats and sites as it cuts through them, from built-up areas in north London and Birmingham to the rolling hills of the Chilterns. This is not surprising as building a new railway through densely populated areas, and avoiding as much built infrastructure as possible (people's homes and business, roads and industry), means England's countryside will bear the brunt of the damage along the route.

Current estimates for damage caused by Phase 1 (and the consultation for Phase 2) shows that at least 9 Wildlife Trust nature reserves, 10 SSSIs, 153 Local Wildlife Sites and 42 proposed Local Wildlife Sites will be subject to direct loss. The Woodland Trust have also stated that at least 41 ancient woodlands will be directly affected by HS2¹. More than 300 further sites (including 42 ancient woods) are at risk from indirect impact such as noise, pollution, shading and dust. Tunnelling may help to lessen the impact in some places but this type of work can still affect hydrology, soils and have other associated impacts. A detailed Environmental Statement for Phase 1 undertaken by HS2 Ltd attempted to quantify the damage and offer some mitigation in compensation for sites of ecological importance lost along the route, committing to 'no net loss' of wildlife habitat. However analyses of the route suggests that the current mitigation proposals are flawed in design and will not achieve 'no net loss'.

Our proposals are designed to achieve a significant net gain for wildlife.

¹ Woodland Trust website
<http://www.woodlandtrust.org.uk/campaigning/campaigns/hs2-rail-link/>

The damage

Directly affected

- 9 Wildlife Trust nature reserves
- 10 Sites of Special Scientific Interest
- 153 Local Wildlife Sites
- 42 proposed Local Wildlife Sites

Total = 214

Indirectly affected

- 12 Wildlife Trust nature reserves
- 17 Sites of Special Scientific Interest
- 247 Local Wildlife Sites
- 61 proposed Local Wildlife Sites

Total = 337

The route passes through
22 Living Landscapes

5 Nature Improvement Areas
(including 4 Defra-funded NIAs)



Bechstein's bat - at risk from habitat loss and severance in the Bemwood Forest area, Buckinghamshire.

One major problem with the methodology of the existing analysis by HS2 Ltd is that it fails to consider the actual and potential loss of ecological connectivity arising from HS2. At the moment mitigation is focussed on what would be lost within the corridor where the line will be laid. But ecosystems have fuzzy edges and often habitats merge into each other. Any mitigation proposals must consider wider ecological functions in a larger buffer zone around the track, around 1km either side.

We must also consider the potential loss of future opportunities to help nature recover. Organisations like The Wildlife Trusts, RSPB and others are increasingly working at a landscape-level – and trying to put back wildlife that has been lost. For us this is largely through our Living Landscapes programme which identifies large target areas of land as a focus for large-scale ecological restoration. HS2 will impact on 22 Wildlife Trust Living Landscape schemes, as well as four Defra-funded Nature Improvement Areas (NIAs) - similar landscape-level conservation projects - and one locally identified NIA (in Manchester). Under current planning law, we can argue that the route should be moved to avoid a particularly important site, or where that is deemed impracticable, we can argue for mitigation for direct habitat loss. But planning law does not function to preserve or restore ecological connectivity across larger areas or between important sites.

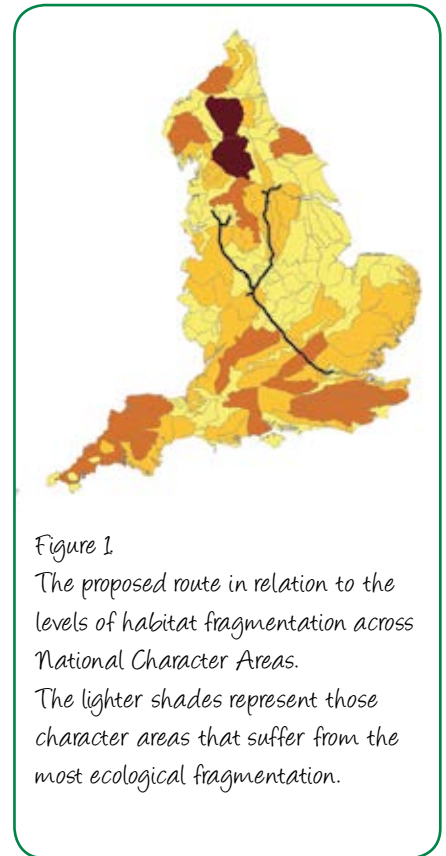


Broadwater Lake - a Herts and Middlesex Wildlife Trust nature reserve in the line of the proposed route.

Our assessment is that over 2,500 hectares of land of conservation interest and potential will be directly lost. More than 300ha of designated sites and priority (but otherwise undesignated) habitat will be lost under the track². A further 1,500 hectares within 80m of the fenceline will be impacted and disturbed by trains. More than 10,000 hectares of land essential to the naturally working landscape (e.g. healthy functioning ecosystems) are likely to be permanently disturbed by HS2.

HS2 will affect parts of England that are already severely ecologically fragmented.

Figure 1 indicates the level of habitat fragmentation in each of England's National Character Areas³. Our site protection and planning system rightfully protects the 'jewels in the crown' (National Parks, SSSIs, Areas of Outstanding Natural Beauty). But there are many more unprotected areas that have declined in wildlife value relatively recently (following post-war agricultural intensification across much of Britain). These will need restoration if we are to ever raise the environmental baseline for our wildlife instead of simply managing its decline. While large areas along the Proposed Route are dominated by an intensive agricultural landscape and are relatively wildlife-poor, the hedges and field margins that they support provide important environmental functions, providing corridors and links between areas of more natural habitat and allowing species to adjust to landscape impacts and disturbances. Significant impacts to protected species and habitats need to be fully addressed by HS2's mitigation and compensation proposals, but these still represent the tip of the iceberg in terms of overall impact on ecology - now and future.



The projected course of HS2 looking toward Euston from Blackgrove Road, Waddesdon

2 Land within the 40m corridor between the fencelines, representing the very minimum of land affected.

3 Adapted from Lawton et al (2010) Making Space for Nature: A review of England's wildlife sites and ecological network.

Despite HS2 Ltd's intent that the development should result in 'no net loss to biodiversity', it is clear that under the current proposals and in view of the evidence presented construction of the line will damage and destroy more wildlife habitat and populations of species than will be replaced - a 'net loss' of biodiversity. Furthermore not all of the Proposed Route has been surveyed for protected species, and where surveys have not taken place, HS2 Ltd has relied on informed estimates. We also believe that the current proposals do not place an adequate value on what is being lost – flower-rich ancient grasslands and ancient woodland are not replaceable habitats.

There are problems with the scale of mitigation proposed and the methodology used. Because ecological systems operate at a range of scales, so must the mitigation. For Phase 1, HS2 Ltd appears to have developed mitigation to reduce fragmentation to just the route corridor rather than to have considered mitigation within a wider buffer zone or the route's true ecological footprint. For example trees removed would be replaced adjacent to the line overlooking an opportunity to create a new area of naturally regenerating woodland 100m away that would help buffer an existing wood. To summarise HS2 is not maximising the opportunity to create more bigger, better and joined patches of habitat when it is within its gift to do so.

Whatever you measure it against - by Government legislation, guidance or rhetoric - **the current proposals for HS2 fall very short when it comes to the environment.**

It is at odds with the ambitions for nature's recovery expressed in many key policy documents such as the Natural Environment White Paper⁴ or the Lawton Review⁵.



Bluebell Wood

4 HM Government (2011) The Natural Choice: securing the value of nature.

5 Lawton et al (2010) Making Space for Nature: A review of England's wildlife sites and ecological network.

3. Our Proposal

3.1 HS2 that connects for nature

We believe HS2 Ltd must now look beyond the current terms of 'mitigation' and 'ensuring no net loss'. Proclaimed by Government as a visionary project, it should be visionary at every level. The socio-economic benefits of green infrastructure are increasingly well-understood and recognised by industry⁶ and public bodies⁷. HS2 should be an exemplar, demonstrating how a major infrastructure development can be used to help restore the natural environment. On April 7th 2014 the Environmental Audit Select Committee published a report 'HS2 and the Environment' which stated that HS2 must "aim higher than the objective of no net biodiversity loss"⁸. It identified several other key flaws with the proposed environmental mitigation and compensation. The Wildlife Trusts want to see a much more ambitious and integrated strategy for mitigation and compensation but this major infrastructure project must go beyond the constraints of these concepts. The opportunity should be grasped to restore nature on a grand scale along a corridor stretching well over half the length of England.

As outlined on p5 our approach is a combination of habitat creation (e.g. wetland creation, tree planting) with areas set aside for natural regeneration in a corridor 1km wide either side of the route. This would buffer or connect existing habitats or provide 'stepping stones' for wildlife by establishing patches of new habitat between existing areas.

To identify what an extensive habitat creation and restoration programme might look like, and for some initial ideas as to how this might be supported by provision of access to nature through cycleways and paths, we held a series of workshops attended by conservationists from Wildlife Trusts along the route (London; Herts & Middlesex; Berkshire, Buckinghamshire & Oxfordshire; Warwickshire; Beds, Cambs and Northants; Leicestershire & Rutland; Birmingham and the Black Country; Staffordshire; Cheshire; Lancashire; Nottinghamshire; Derbyshire; Sheffield and Yorkshire Wildlife Trusts). Appendix 1 contains details of the full methodology (p18).

We considered the location, quality and area of existing designated and undesignated habitats, and identified opportunities for three broad types of habitat creation (woodland, grassland and wetland) within a 1km buffer of the Proposed Route. The aim was to get a sense of the scale of ecological opportunity that was detailed enough to give provisional costings and show what could be done, but that would need to be developed to a fine level at later stages in consultation with local communities and experts from a range of environmental organisations. This would ensure that nature restoration and newly created habitats are sensitive and appropriate to their location.



Orange-tip butterfly

6 Landscape Institute (2011) *Local Green Infrastructure*.

7 Sunderland, T (2012) *Microeconomic evidence for the benefits of investment in environment* (NERR033).

8 Environmental Audit Committee (2014) *HS2 and the environment*

Figure 2

Hixon, Staffordshire Extract from Map 4

Legend

Potential Habitat Creation

-  Grassland
-  Woodland
-  Wetland

Generalised NE Habitat Inventory (PHI)

-  Grassland
-  Woodland
-  Wetland
-  Other

HS2 Route

-  Route
-  Tunnel
-  Viaduct
-  1km Buffer (each side of route)

Living Landscape

Designated Sites

Sustrans National Cycle Route

Suggested Cycle Route

Route Connections (LS2)



The land around Hixon in Staffordshire is part of the Staffordshire Rivers Living Landscape project area. It includes many important wildlife sites along the River Trent Valley floodplain, such as Pasturefields Salt Marsh SSSI, a Wildlife Trust nature reserve, which could be surrounded once more by new grassland and wetland habitats. This would also link up to sites further from the line such as the former Hixon airfield, great for scarce farmland birds, plus Charley Moss National Nature Reserve and Blithfield Reservoir SSSI. An important wet grassland at Upper Moreton, to the east, will be cut in half by HS2, but with much scope to restore meadows stretching along the Bourn Brook. With a firmer commitment to minimising the environmental impact and a much more ambitious environmental vision, HS2 could play a major part in joining up these scattered gems and contribute to long term plans for the area.



Within the Hixon Living Landscape project area, Staffordshire.

3.2 HS2 that connects for people

An HS2 that enhances local ecological networks can benefit more than just wildlife. The creation of a wild green corridor of spaces for nature adjacent or close to the line also provides space to locate 'Low Speed 2' – cycleways and footpaths that connect into the broader national cycle network. Here, as with the development of ecological connectivity, HS2 could deliver far wider benefits than just a high speed rail link by developing a multi-modal transport corridor and reconnecting communities at a local level.

Delivering and sustaining

Safeguarding funds to ensure long-term habitat management is critical but this could be undertaken in a cost-effective way. A practical approach would be to establish local partnerships with a wide range of existing bodies such as active environmental groups, charities, councils, 'Friends Of' groups, nature conservation organisations and others along the route of the line to develop cohesive ecological and low-speed transport strategies.



4. Finances and Cost-Benefit

4.1 Introduction

Partnerships like this could bring together access, landscape conservation, farming and education. To assess the feasibility of our proposal we commissioned researchers at Newcastle University⁹ to undertake a Cost-Benefit Analysis. The findings are presented here. This concluded that, relative to the scale of HS2, restoring ecological connectivity as proposed by The Wildlife Trusts, is affordable. It is a sensible investment that delivers important benefits beyond the establishment of a high speed rail line. The analysis is necessarily broad-brush in its scope at this stage, but it is enough to suggest that HS2 should be much more ambitious in relation to the development of green infrastructure around the line and within the wider ecological catchment area affected by the Proposed Route.

4.2 Costs

We estimate that the total cost of creating and restoring almost 15,000 hectares of habitat and access provision in line with our proposals would be around £130million, representing c.0.3% of the £42.6bn total budget for the HS2 project (Table 1). This figure includes the establishment of 13 small pedestrian bridges but does not include additional large-scale green bridges for wildlife. Even allowing for the construction of a number of these, based on our provisional costings our proposal would use less than 1% of the HS2 budget.

Table 1. The costs of implementing The Wildlife Trusts' Vision for HS2 across Phases 1 and 2 (habitats).¹⁰

Landscape type	Area (ha)	Cost to establish (£'000s)	Cost to maintain p.a. (£'000s)
Wetland	2,800	9,400	1,700
Woodland	8,500	53,500	6,000
Grassland	3,500	15,000	2,500
Total	14,800	77,900	10,200

Improving access to the countryside for local communities is a key part of our vision for HS2. We have identified around 195km of routes (footpaths and cycleways) which could realistically be created. These should be designed and delivered by access, mobility and education groups with necessary expertise in these areas so our costs are provisional. The costs for these are £42million, (plus an additional £8m for 13 bridges) representing 0.1% of the total HS2 budget (Table 2).

Table 2. The costs of implementing The Wildlife Trusts' Vision for HS2 across Phases 1 and 2 (access).

Access creation	Length (km)	Cost to establish (£'000s)	Cost to maintain p.a. (£'000s)
Foot and cycle paths (including bridges)	195	50,100	23

9 Higgins and Garrod (2013) *Cost Benefit Assessment for The Wildlife Trusts' HS2 Vision*.

10 The establishment and maintenance costs are based on data from Yorkshire Wildlife Trust. They looked at the median establishment and maintenance costs for the three habitats on 65 sites across Yorkshire. It is recognised that there may be slight variations in these costs across England. The figures used for establishment are woodland £6,300/ha; wetland £3,300/ha; and grassland £4,300/ha. The figures for maintenance are woodland £700/ha/annum; wetland £600/ha/annum; and grassland £600/ha/annum. The costs to establish and maintain the foot and cycle paths are also based on Yorkshire Wildlife Trust data. The figures used are £90 per square metre to establish and £120/km/annum to maintain.

4.3 Cost Benefits

The Cost-Benefit Analysis is a scoping exercise, using Benefits Transfers to identify likely costs and benefits for each type of habitat restoration and access creation. The analysis drew on research published by UNEP-WCMC¹¹ to apply a discount rate to estimate the Net Present Value (NPV) of the benefits over the evaluation period (2014 to 2093), in line with that carried out by HS2 Ltd¹².

For the purposes of the exercise, a number of assumptions were made that simplified the assessment, and it should be noted that simple changes to the approach proposed could have implications for the Cost-Benefit Ratio (CBR). Furthermore, numerous elements which are typically included in environmental economic assessments (such as profit from grazing, timber felling and Willingness to Pay surveys) could not be included as they could not be calculated for the entire route. If these were to be included then the benefits for the landscape types could increase further.

The Cost Benefit Analysis for grasslands does not include any direct payments (e.g. through environmental stewardship schemes). Also not included here are other benefits such as increased volunteering and education opportunities.

Table 3. Cost-Benefit Ratio (CBR)

Habitat restoration and new Rights of Way creation	Aggregated costs (£'000s)	Aggregated benefits (£'000s)	Cost:Benefit Ratio
Upper bound values	420,000	575,000	1:1.4
Lower bound values	420,000	540,000	1:1.3

11 UNEP-WCMC, Cambridge (2011) UK National Ecosystem Service Assessment.

12 Department for Transport (2013) *The economic case for HS2*.



Naturally regenerating woodland within the National Forest project area in Staffordshire.

The precise costs to establish habitats will vary from site to site. Assuming a requirement for extensive planting, seeding and fencing programmes as required for each habitat, the cost-benefit ratio is about 1:1, i.e. investment costs are covered. Reduced establishment costs, through deploying natural regeneration or traditional planting schemes, generates a stronger CBR of 1:1.2 – 1:1.3¹³. The analysis shows that investing in green infrastructure and habitat creation is likely to be viable, delivering a positive return on investment with the benefits outweighing the costs. We also believe this is likely to be a conservative estimate due to a number of values we are unable to include at this time such as the value of recreation benefits provided through the establishment of new areas of habitat, payments through agri-environment or similar land management schemes or adjustments for Willingness to Pay surveys.

¹³ Department for Transport (2013) The economic case for HS2. HS2 Ltd released *The Economic Case for HS2* in October 2013. The headline figures from that are that the post-estimate CBR for the whole y-route is 1:2.3 and for Phase 1 is 1:1.7.

Conclusion

The impact of the Proposed Route on some of our most valuable habitats and species, including ancient woodlands and Areas of Outstanding Natural Beauty, has naturally been the focus of much of the debate around the environmental impact of HS2. However we believe that, if HS2 is to go ahead, there is an urgent need to reframe its environmental vision, moving away from the restrictive and flawed mitigation and compensation described in the Environmental Statement to a much wider acknowledgement of the scale of opportunity for a ground breaking nature restoration project. With an infrastructure investment on the scale of HS2, we should be doing so much more than ensuring 'no net loss'. Our Cost-Benefit Analysis shows that our proposed approach is not only affordable within the scale of the wider project, but that it could also bring much needed investment in England's nature that will deliver benefits in excess of its initial costs.

This challenge to HS2 is intended to be a positive contribution to the debate around the environmental impact of this major infrastructure project. Some habitats can never be recreated, but the least we should be doing is to build resilience in our ecosystems, to allow plants and animals to keep up with the pace of change that we impose on the landscape. Habitat creation at a range of scales can have significant impacts that are highly cost effective: enabling wildlife to flourish, reducing our contribution to climate change, providing space to grow food and giving us spaces in which we can relax and be healthy. It might also give train passengers a more pleasant journey too.



Small blue butterfly. HS2 threatens Northamptonshire's only population of the nationally scarce blue butterfly at Helmdon Disused Railway SSSI which will be severed by HS2.

5. Appendices

5.1 Methodology

Step 1

Desk-based research produced a GIS dataset of the whole route that included Natural England's Priority Habitat Inventory along with nature conservation designations and access routes. The data sets were shared with participants before the workshops to enable consultation within each Wildlife Trust.

Step 2

Workshops were held to review and confirm potential impact on existing habitats and to identify opportunities for habitat creation and enhancing ecological connectivity by drawing onto the base maps. In developing these proposals, the following guidance was issued:

- Habitat creation is the norm although enhancement may also be suitable as HS2 must substantially add to ecological connectivity to mitigate for the significant loss of current and potential ecological connectivity as a result of the line.
- The location and form of each 'stepping stone' (patch of habitat) will vary according to local needs though participants were aware that proposals needed to be realistic (in the context of budgets available to HS2).
- Proposals should manifestly contribute to ecological connectivity (i.e. be ecologically coherent) but habitats created or enhanced would generally be managed through a low intensity management regime. See diagram on p19.
- And where possible, these stepping stones should be able to incorporate as many other ecosystem services as possible (e.g. sustainable drainage, flood prevention, cycle routes, soil carbon storage, food production etc.).

Step 3

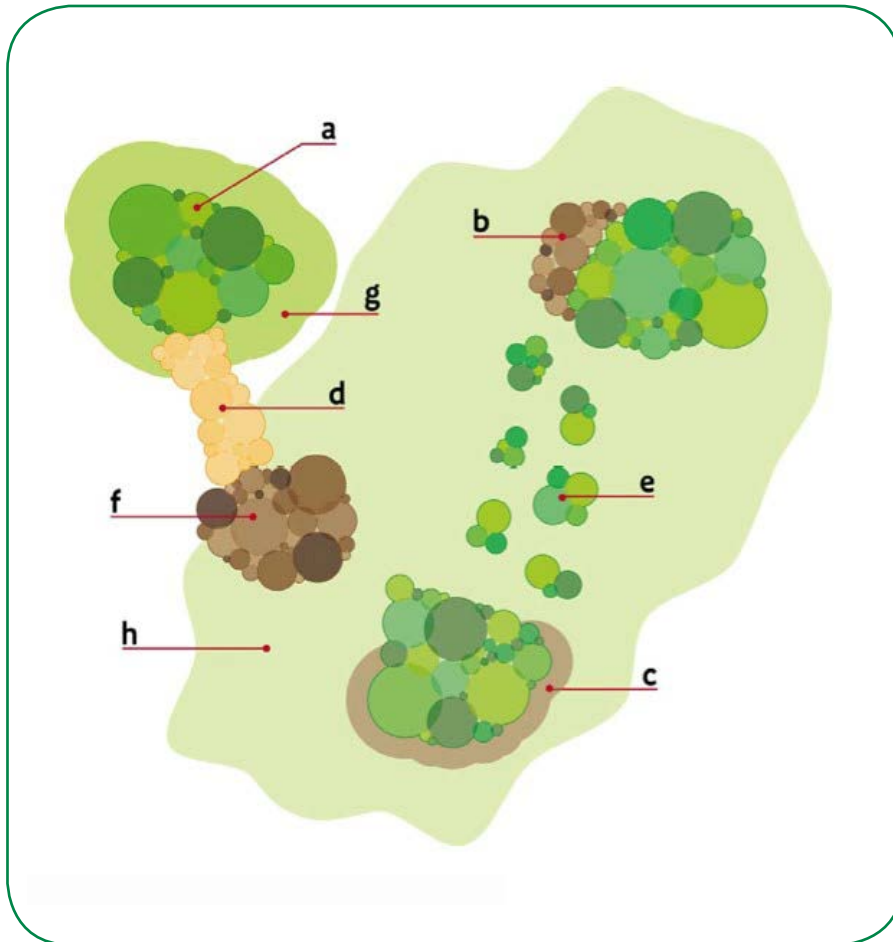
Resulting maps and habitat opportunity boundaries were digitised to allow the maps to be rechecked by local Wildlife Trust staff allowing further iterations.

Step 4

The final output maps were scanned for consistency across the whole route and work was undertaken to develop a realistic and costed programme of works that we would expect HS2 to incorporate into its construction and management programme.

Step 5

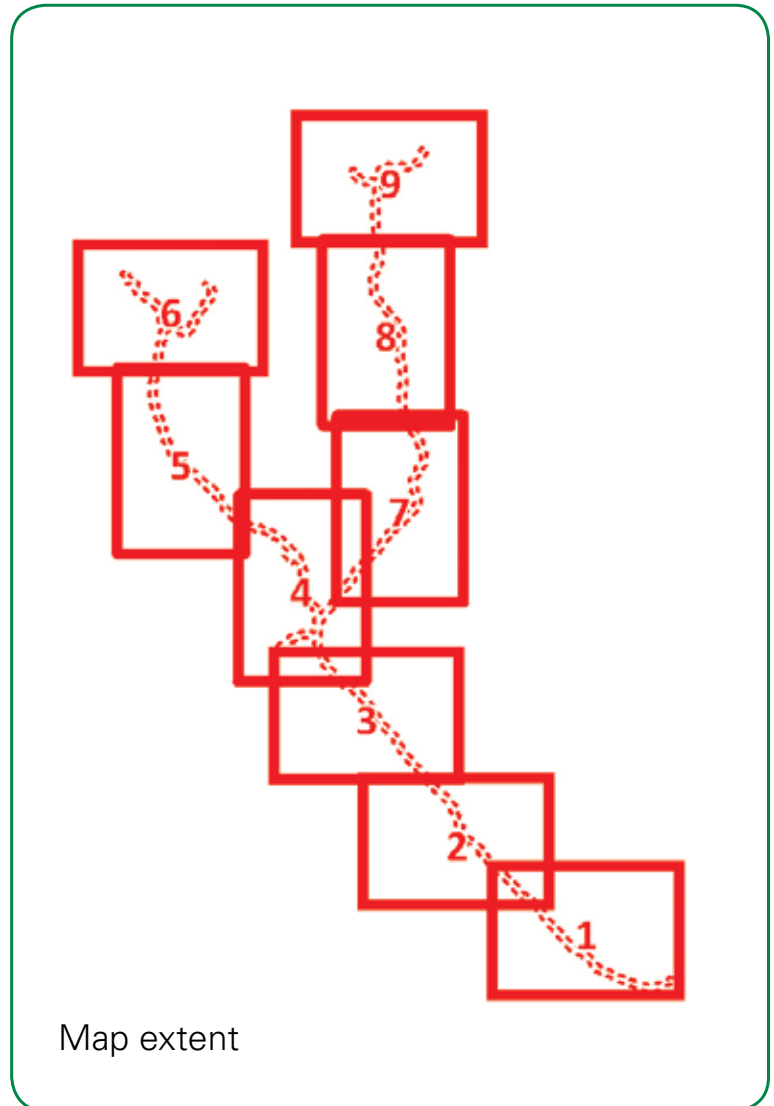
Details on the costs were provided to Newcastle University to undertake a Cost-Benefit Analysis of the proposals.



Our approaches to enhancing ecological networks are in line with best practice, embracing a range of techniques appropriate to the sensitivity and opportunities in different locations:

- a) Improve the quality of existing habitat patches
- b) Make existing sites bigger
- c) Create ecotones (transition areas between ecosystems)
- d) Enhance connectivity through a continuous corridor
- e) Enhance connectivity through a stepping stone corridor
- f) Create new sites
- g) Reduce pressures on sites by establishing buffer zones
- h) Reduce pressure on sites by enhancing the wider environment.

Appendix 2. Maps



Legend

Potential Habitat Creation

- Grassland
- Woodland
- Wetland

Generalised NE Habitat Inventory (PHI)

- Grassland
- Woodland
- Wetland
- Other

HS2 Route

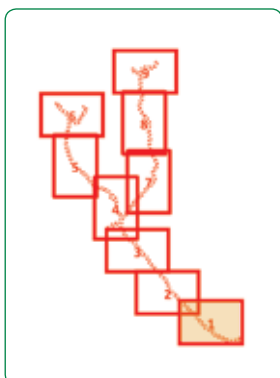
- Route
- Tunnel
- Viaduct
- 1km Buffer
(each side of route)

- Living Landscape
- Designated Sites
- Sustrans National
Cycle Route
- Suggested Cycle
Route Connections
(LS2)

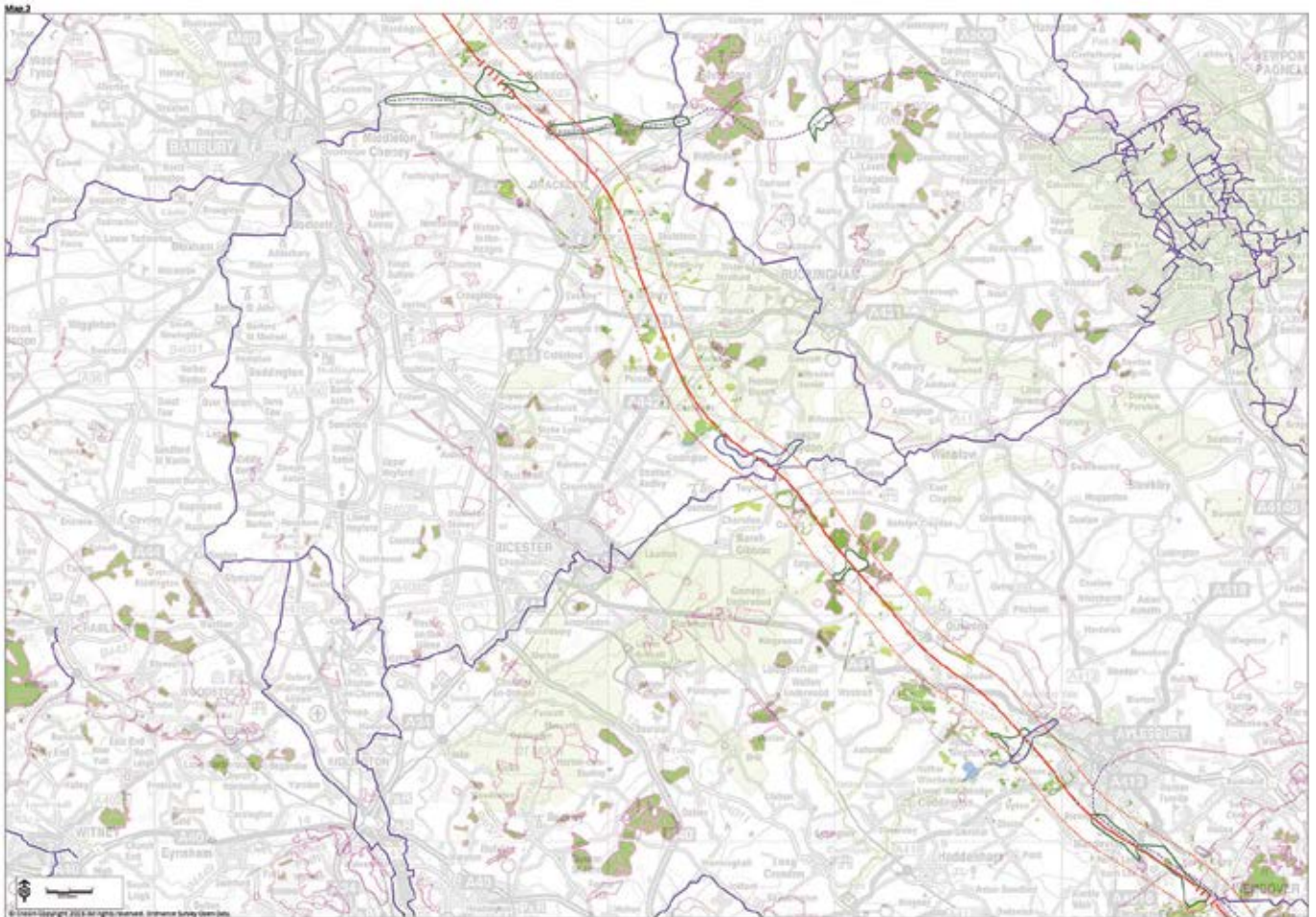


Map 1

Note: Proposals have been put forward by a number of organisations for a full-bored tunnel through the Chilterns AONB to help preserve this special landscape. This is not indicated on the map above but we support this proposal. This is an example of where the wider approach to protection and mitigation we are proposing would be detailed and implemented by a number of organisations and local communities as part of the HS2 programme. This map also does not show the most recent tunnelling proposals for the Northolt corridor extending the route sub-surface from Old Oak Common to West Ruislip in west London.



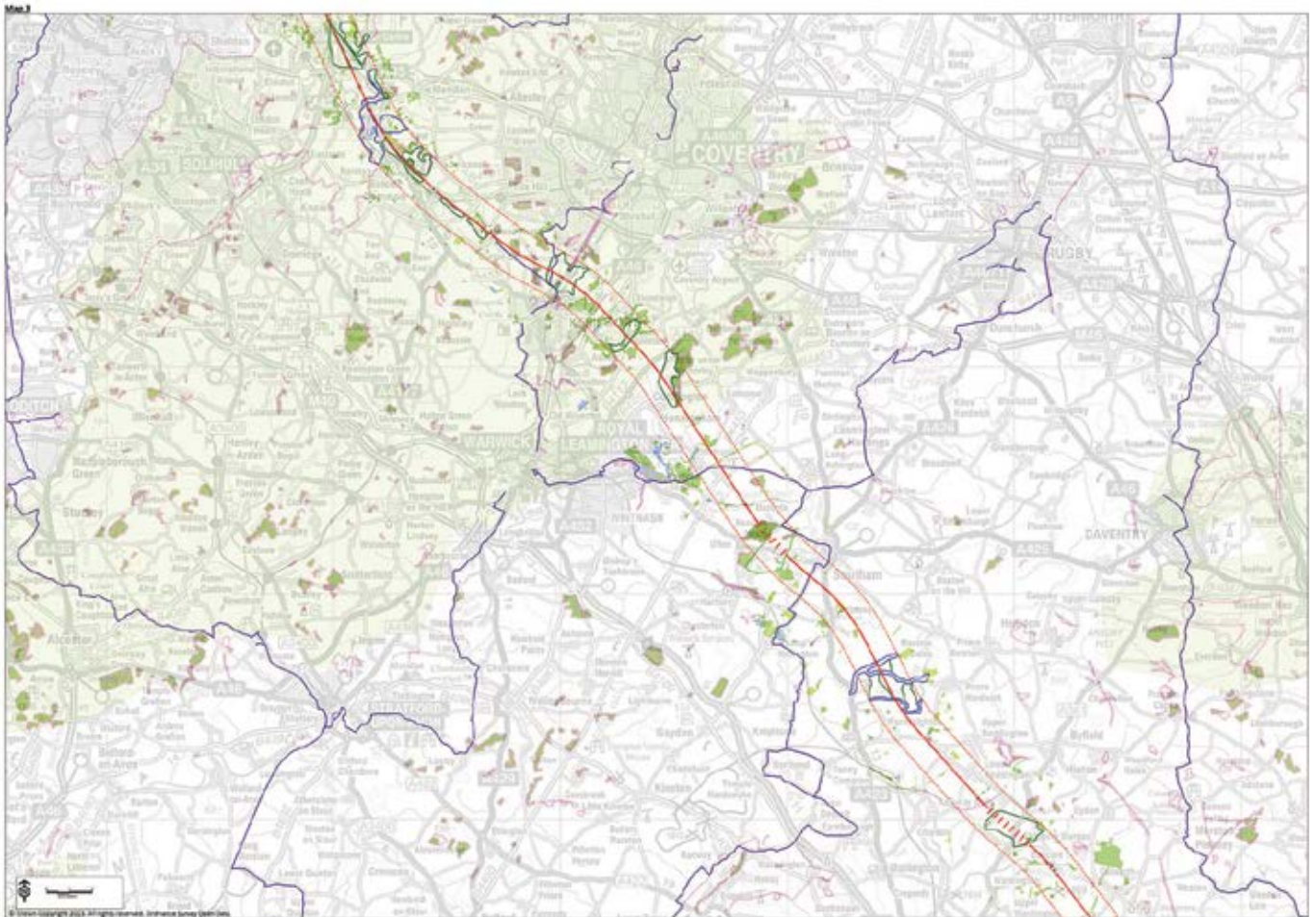
Note: Where the proposed HS2 line bisects existing habitats additional work to avoid impact on some of these habitats is still required. The suggested habitat creation areas are indicative only and other configurations may achieve the same aims.



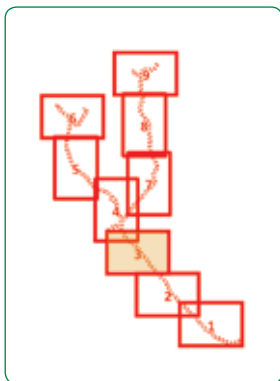
Map 2



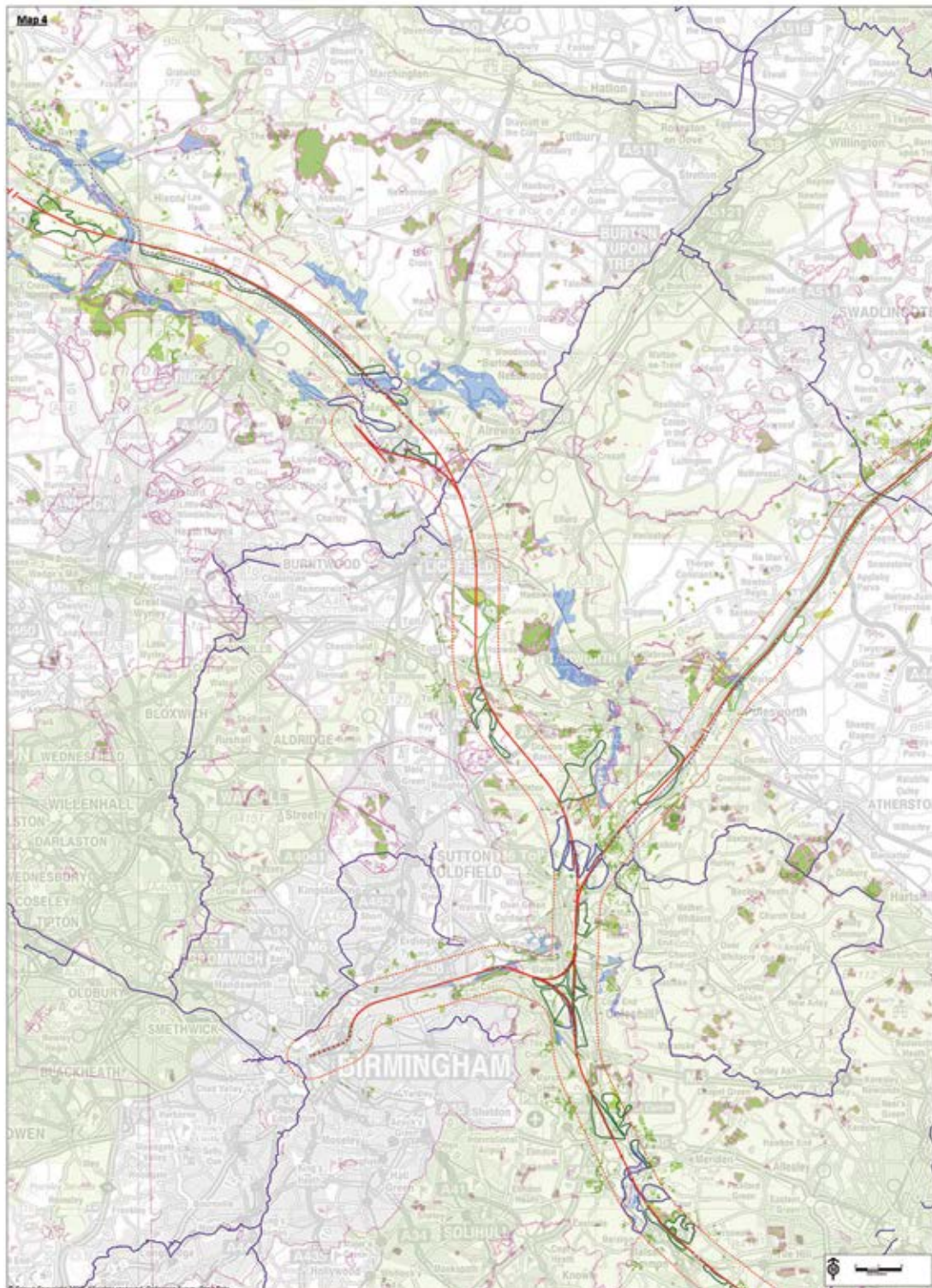
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Map 3



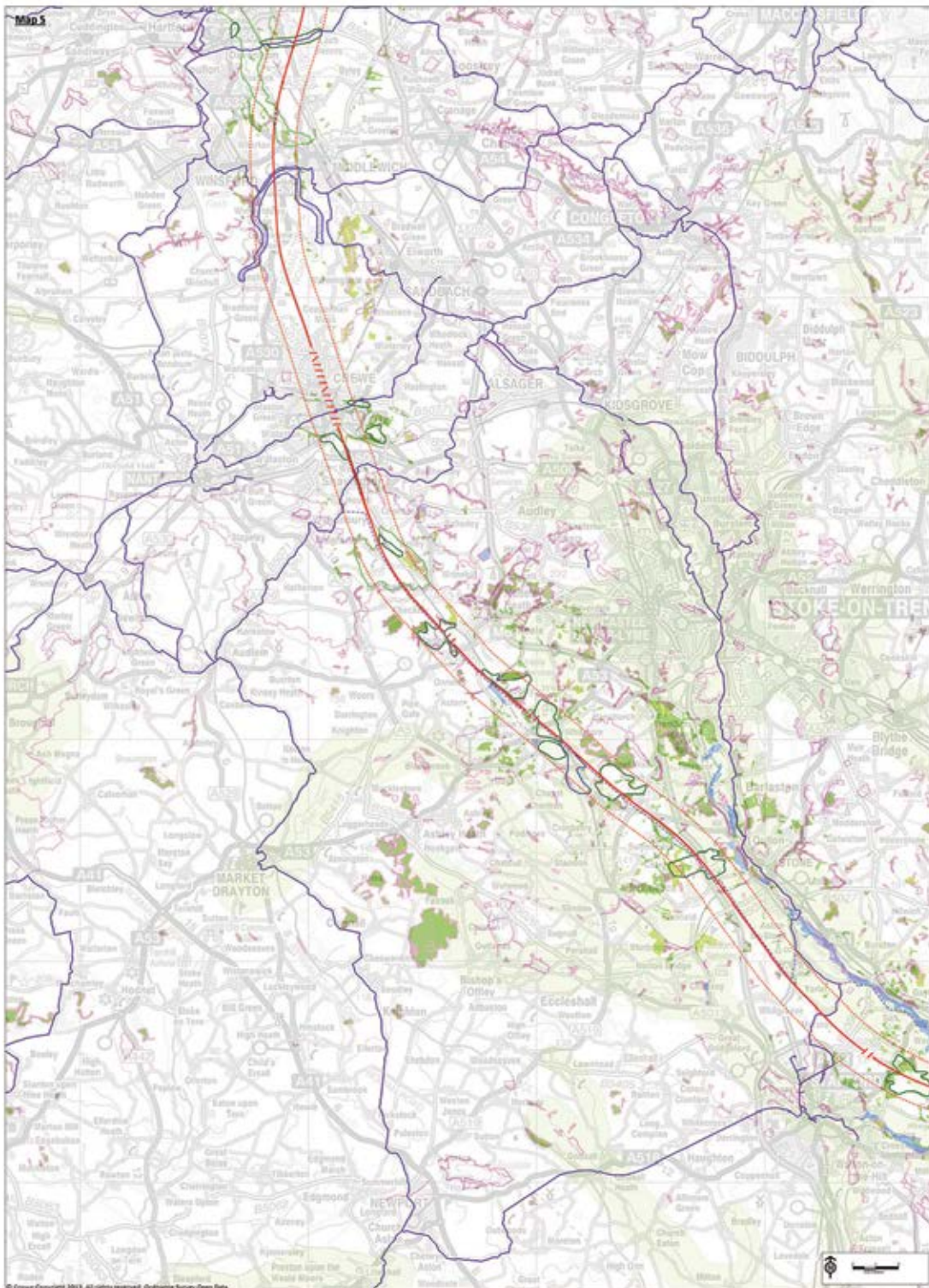
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Map 4



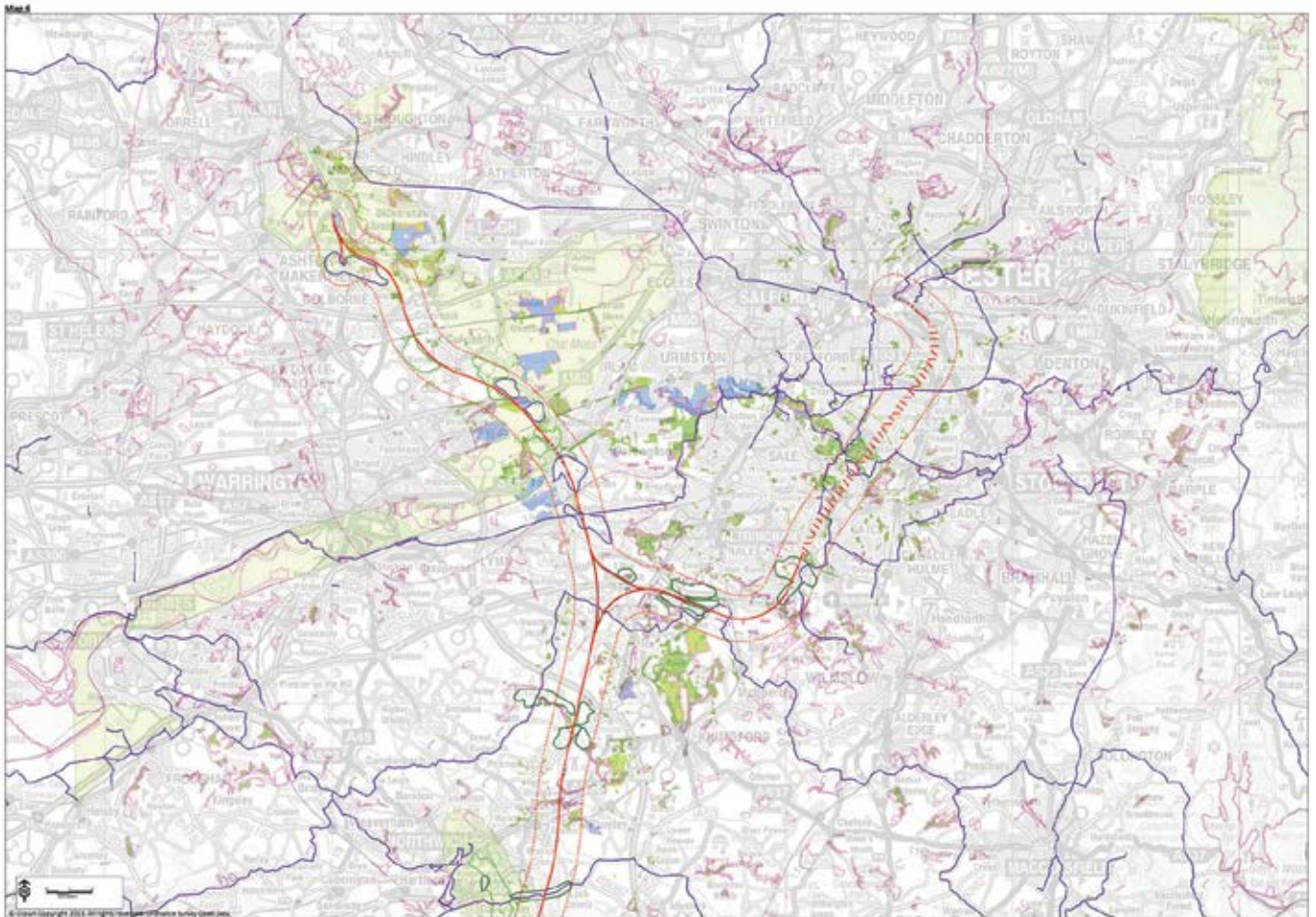
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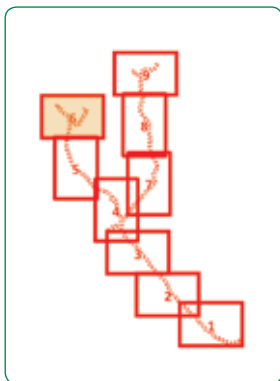
Map 5.



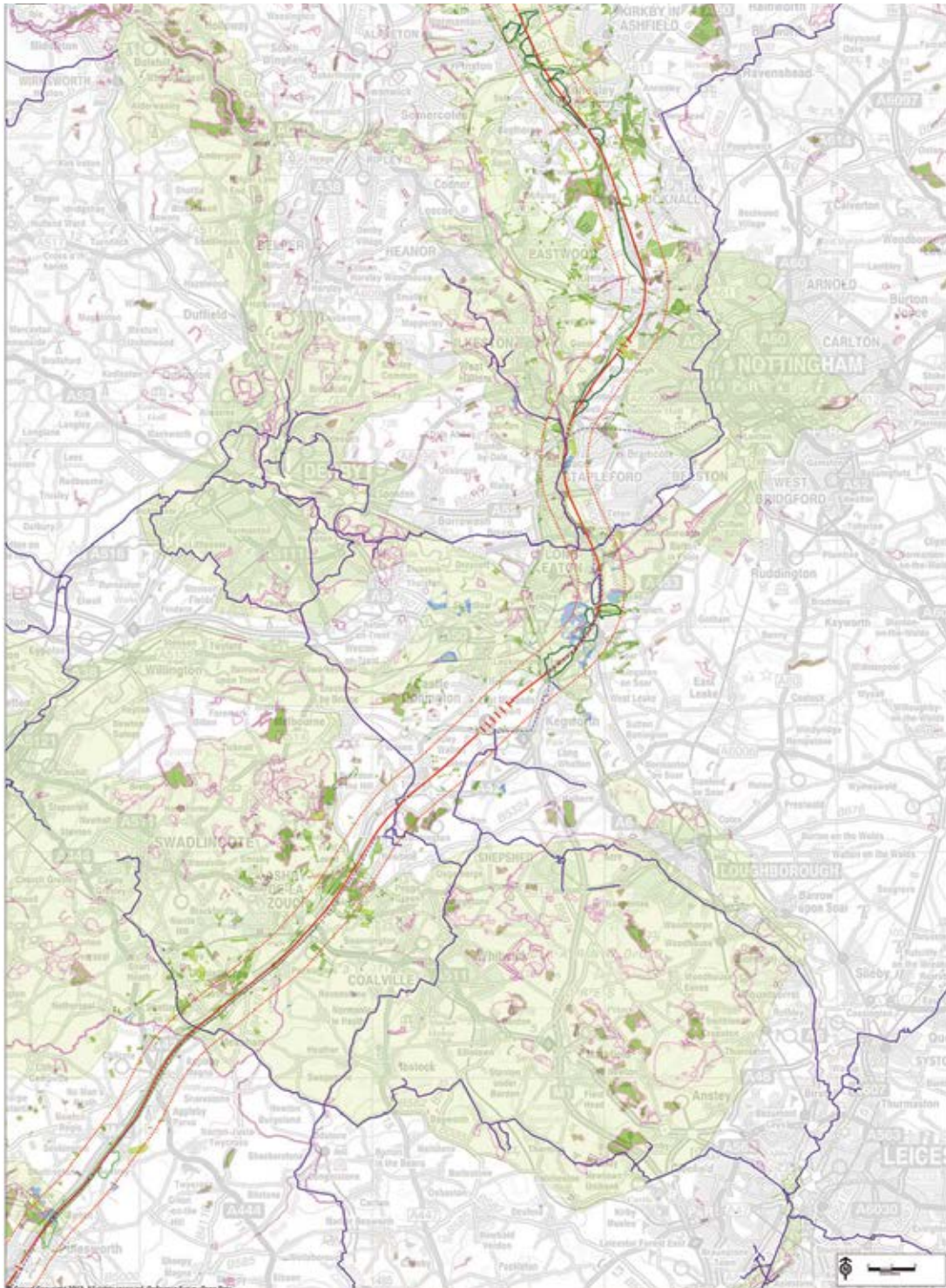
Note: Where the proposed HS2 line bisects existing habitats additional work to avoid impact on some of these habitats is still required. The suggested habitat creation areas are indicative only and other configurations may achieve the same aims.



Map 6.



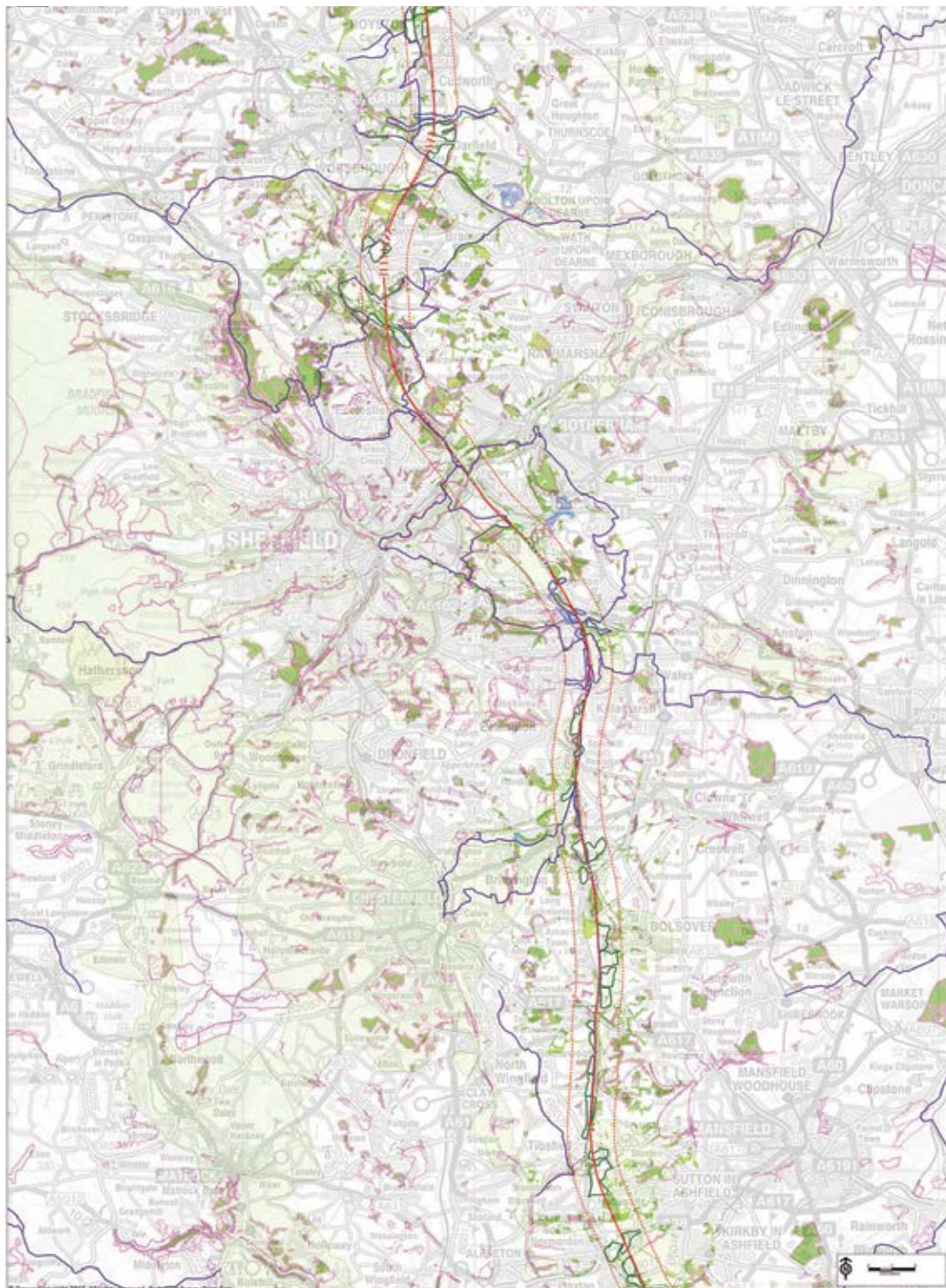
Note: Where the proposed HS2 line bisects existing habitats additional work to avoid impact on some of these habitats is still required. The suggested habitat creation areas are indicative only and other configurations may achieve the same aims.



Map 7



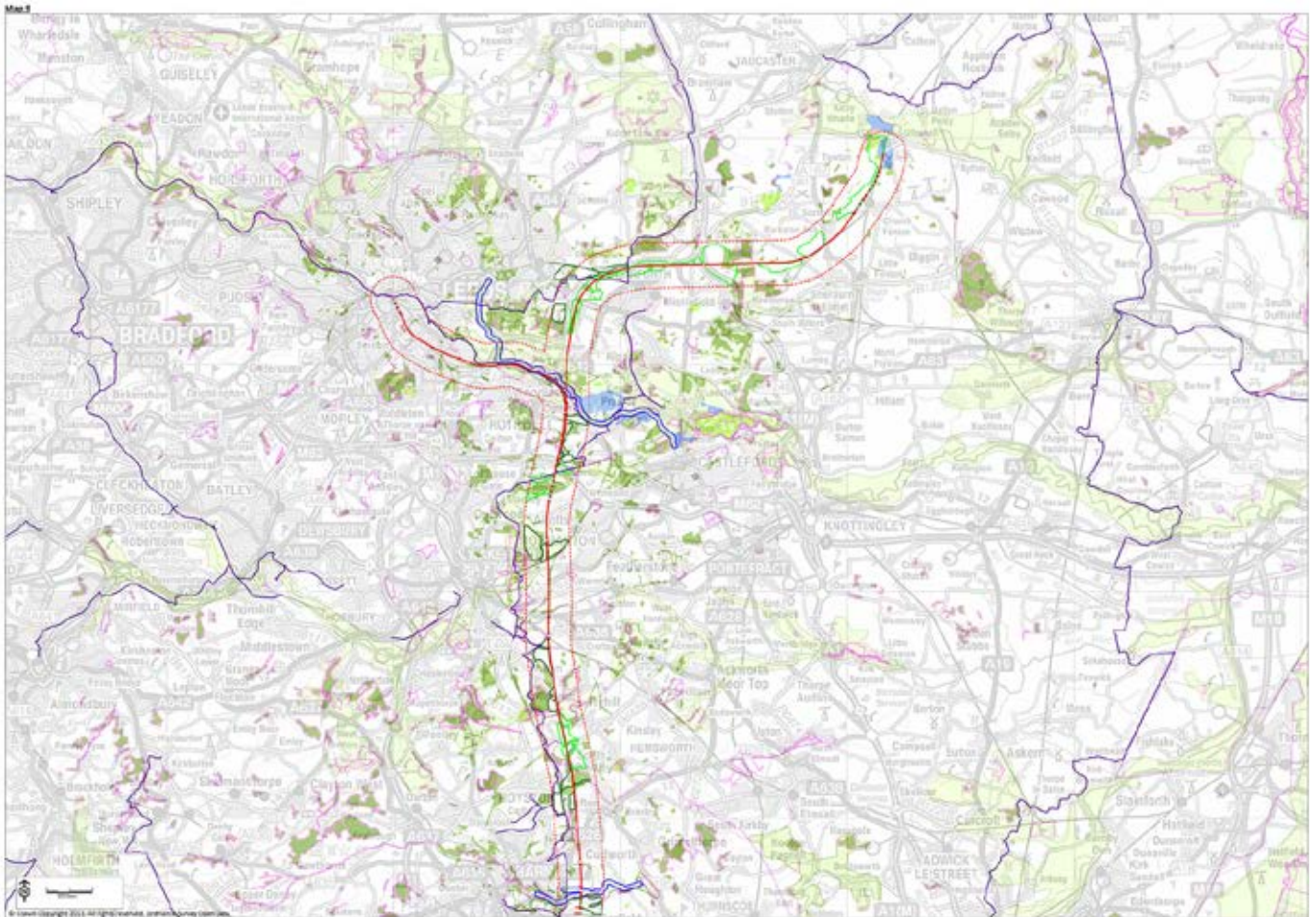
Note: Where the proposed HS2 line bisects existing habitats additional work to avoid impact on some of these habitats is still required. The suggested habitat creation areas are indicative only and other configurations may achieve the same aims.



Map 8.



Note: Where the proposed HS2 line bisects existing habitats additional work to avoid impact on some of these habitats is still required. The suggested habitat creation areas are indicative only and other configurations may achieve the same aims.



Map 9.



Note: Where the proposed HS2 line bisects existing habitats additional work to avoid impact on some of these habitats is still required. The suggested habitat creation areas are indicative only and other configurations may achieve the same aims.

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woodlandtrust.org.uk

For more information go to wildlifetrusts.org/HS2

Or contact the individual Wildlife Trusts:

Bedfordshire, Cambridgeshire & Northamptonshire Wildlife Trust
wildlifebcn.org.uk

Berkshire, Buckinghamshire & Oxfordshire Wildlife Trust
bbowt.org.uk

Birmingham & the Black Country Wildlife Trust
bbcwildlife.org.uk

Cheshire Wildlife Trust
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Derbyshire Wildlife Trust
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