



Gloucestershire



National Trust



A417 Missing Link Project

Briefing Note for the Access Bridges

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1 Introduction

The purpose of this document is to set out what our expectations are from Highways England's input into the process. Ultimately our role is to comment upon those designs. The report focuses on four bridges at Emma's Grove, Shab Hill crossing and the Cowley/Stockwell crossings, proposed by the 'A417 Missing Link Project', and uses Highways England's Aesthetic Appraisal Document methodology.

Its aim is to explore the opportunities presented by the scheme, find common ground between the requirement for the road, limit the negative impacts, and mitigate where this is not possible.

The following organisations have been involved in this collaborative document:



1.1 Cotswolds Conservation Board

The Cotswolds National Landscape is a designated Area of Outstanding Natural Beauty, looked after by the team at the Cotswolds Conservation Board, in partnership with a number of other organisations. The Cotswolds Conservation Board is an independent statutory body that works to conserve and enhance the natural beauty of the Cotswolds AONB; to increase understanding and enjoyment of its special qualities; and to foster the social and economic well-being of local communities. It was established by Parliamentary Order in 2004 and is one of only two Conservation Boards in the country, the other being the Chilterns.

1.2 Gloucestershire Wildlife Trust

The Gloucestershire Wildlife Trust (GWT) is the largest wildlife charity focused on Gloucestershire. It was founded in 1961 by Sir Peter Scott, currently has 28,000 members, manages over 1000ha of land as nature reserves, and plays an integral role advising on nature's recovery in the county. The Trust has a vision where each year there is more wildlife, more wild places and more people with connection to the natural world. The vision is achieved by:

- Creating bigger, better more connected places where people and wildlife can thrive.
- Inspiring more people to appreciate and take action for nature in towns and the countryside.
- Leading on natural solutions and protect our wildlife and wild places in Gloucestershire.

GWT is managed by a Board of Trustees who provide overall direction for the development of the Trust. The work of the Trust is carried out through staff and volunteers. GWT is a member of the Royal Society of Wildlife Trusts, the umbrella organisation which campaigns at a UK level.

1.3 National Trust

The National Trust is a charity that works to preserve and protect historic places and spaces 'forever, for everyone'. Founded in 1895, The National Trust played a large part in securing the preservation of country houses. Equally important has been their undertaking to preserve the settings of buildings and the landscapes of England, Wales and Northern Ireland. The National Trust looks after over 610,000 acres of land in its care. The National Trust is represented in each property by a General Manager whose team is responsible for the running of Mansions, built properties, gardens and parkland and areas of countryside and coast in accordance with the Trust's policies and aims. Each property is supported by a regional consultancy team that offers the property advice on conservation, construction, design,

curation, archaeology and planning. The projects undertaken by each property are governed by a Project Board.

1.4 Scope of the application

The purpose of this document is to present our joint understanding and expectations for the four bridges, noted above, proposed by the ‘A417 Missing Link Project’, using Highways England’s Aesthetic Appraisal Document methodology. The four bridges are: Emma’s Grove crossing, Shab Hill crossing and the Cowley/Stockwell crossings.

1.5 Options Development

The design process will be an iterative one, with multiple initial options which are then tested and reviewed with respect to the chapter headings noted within the PEIR over the construction and operation phases. Effects, both positive and negative, will need to be balanced with the practical requirements of the structures and costs. The production of summarised reports setting out this analysis and review is in the scope of this commission. Ultimately, the bridges are only economically feasible if their value is equal to or higher than their cost. The value of a bridge is the sum of several components—including its functional value, social value, and aesthetic value.

1.6 Information provided by Highways England

The table below outlines key baseline documents which have been received to date and which are fundamental to considered design development, methodology, ensuring that landscape impact is minimised.

Title / Description	Author	Year
<p>A417 Missing Link – Preliminary Environmental Information Report Key chapters include: Landscape and visual, Cultural heritage and Biodiversity</p> <p>NOTE – this covers the project as a whole but is not focused on the four bridges specifically. Refinement is required to understand how the baseline information relates to the sites. The draft PEIR does not include Technical information that is key to design development and impact assessment.</p>	Highways England	09/19

The Preliminary Environmental Information Report from September 2019 identifies Further Works required, with respect to each chapter heading. Before the designs for the access bridges are finalised, they will need to be reviewed and checked with respect to the additional baseline information gathered.

The key objectives for the design outcome should be understood and defined through a multi-disciplinary design and review process. The primary design focus is to minimise the impact and maximise gains in the landscape, setting of key heritage assets and biodiversity whilst at the same time providing key physical linkages for pedestrians, cyclists, horse riders and the NT’s Belted Galloway cattle. This should be based on a whole landscape approach that brings together and analyses a full understanding of how this landscape and its wider setting has functioned and has delivered ecosystem services over time and how these can be sustained and enhanced in the future.

1.7 Design outcomes

The following aspects (which come from CD351 – the design and appearance of highways structures) should be in focus when designing:

- 1) proportion and integration of structures (in terms of their scale) within the landscape
- 2) options for contrast/harmony with surrounding environment

- 3) proportions of spans/length and height;
- 4) symmetry/rhythm/line/order of principal elements;
- 5) materials and finishes, including road surfaces which will have a profound impact visually and in terms of noise levels;
- 6) parapets and other elements that contribute to rhythm;
- 7) lighting and signage;
- 8) managing the effects of water and weathering;
- 9) structure curtilage;
- 10) viewpoints from and to the structure and how they have changed;
- 11) potential for developing a design language amongst structures along route.
- 12) Potential for design to contribute to scheme mitigation/enhancement.

2 Environmental factors and evidence base to inform the design process

2.1 Commitment to aesthetics

Title / Description	Author	Year
Design Principles – achieving good design in buildings and landscapes.	National Trust	Sept 19

2.2 Community/Stakeholder engagement

Community: Adjoining Parish councils, Cotswold Planning authority, User groups including rambler clubs.

Statutory stakeholders: Gloucestershire Wildlife Trust, Cotswold Conservation Board, National Trust, Natural England, Environmental Agency, Historic England, Gloucestershire County Council.

2.3 Understanding of sensitivity of context in the landscape

The following reports provide further baseline information:

- 1) function;

Title / Description	Author	Year
Active Design: Planning for health and wellbeing through sport and physical activity	Sport England	2015

- 2) adjacent land use and infrastructure features;

- 3) the presence of other highway structures (either adjacent to or along route);

Title / Description	Author	Year
Design Manual for Road and Bridges, Vol 10	Standards for Highways	2004

- 4) geotechnical and geological characteristics;

Title / Description	Author	Year
Crickley Hill and Barrow Wake SSSI – Reasons for Designating the SSSI	Natural England	2004
Crickley Hill and Barrow Wake SSSI – Our Views About Management (VAM) of the SSSI	Natural England	2004

5) character of landscape or built environment;

Title / Description	Author	Year
Cotswolds Landscape Strategy and Guidelines	Cotswolds Conservation Board	2016
LCT 1: Escarpment	Cotswolds Conservation Board	2016
LCT 3: Rolling Hills and Valleys	Cotswolds Conservation Board	2016
LCT 7: High Wold	Cotswolds Conservation Board	2016

6) ecology/biodiversity;

Title / Description	Author	Year
Gloucestershire Nature Recovery Network (NRN)	Gloucestershire Wildlife Trust (o/b Gloucestershire LNP)	2020
Crickley Hill and Barrow Wake SSSI – Reasons for Designating the SSSI	Natural England	2004
Crickley Hill and Barrow Wake SSSI – Our Views About Management (VAM) of the SSSI	Natural England	2004
Making Space for Nature – The Lawton Report	DEFRA	2010
Crickley Hill Biological Survey Report	NT	2015
Veteran Tree survey report – NT Land	NT	2020
Saproxyllic invertebrate report – NT Land	NT	2020

7) views of or in the case of bridges, from the structure;

Title / Description	Author	Year
LA 107 Landscape and Visual Effects Guidelines for Landscape Visual Impact Assessment (GLVIA3)	Highways England Landscape Institute	2020 2013

9) community values and objectives.

Title / Description	Author	Year
LA 106 Cultural Heritage Assessment	Highways England	2020

The LNP natural capital baseline maps will be available shortly and should be referred to.

2.4 Cost and aesthetics

At the time of writing there is no defined budget for the construction of this project. The budget will inevitably have a significant impact on the scope for variation in design, from more standard solutions.

2.5 Sustainability

To be considered with:

- 1) understanding of historic landscape and respect for heritage;
- 2) improved amenity for local communities;
- 3) connectivity of communities;
- 4) understanding of the natural and historic environment and habitat/network resilience;
- 5) accommodation of inspection and maintenance;
- 6) longevity in terms of flexibility for future adaptation.

2.6 Future management of the bridges

This should be brought into design development as well as by considering long term relationships and funding. Long term funding is obviously a consideration here. This is particularly true in the context of Shab Hill where whatever landscape is created will grow, develop and change over time. Designing structures and various planting schemes that have this long term commitment in sight will be important.

3 Approach to the design

3.1 The big picture

We need a bold approach, in which the 'same old' and rather compartmented ways of addressing schemes and layering the significance of the landscapes around them is changed.

We need a clear emphasis on:

- the inter-relationship of human and natural factors - the key legacy of this is the inter-visibility of prehistoric ritual and settlement/ defensive sites on the higher land (including the long views west), the medieval assarted scarp edge with its multi-species field boundaries, post-medieval and post-1750 adapted and (on the High Wolds) transformed agricultural landscapes (the latter being a significant change to the ecosystem) and when looking into the valley the impact of transport/ aeronautical (Brockworth, roads, M5), industrial and residential infrastructure: modern transport has brought massive disruption to this area, inhibiting the movement of and acting as a constraint on the ability of species to adapt and flourish
- changing uses and perceptions of the landscape, based on using and further developing the conservation values approach; this could be supplemented by consideration of how this landscape has delivered benefits (ecosystem services) to people and habitats over time, how it functions now, through identifying the issues/ factors that present risks and threats (climate, poor connectivity, limited understanding of the landscape etc) and how these services can be enhanced in the future.

There needs to be an integrated whole-landscape approach that is clearly communicated; this must include consideration of how non-designated and non-priority habitats that get low gradings in the EIA process have been created and changed within patterns of changing land use - vital for identifying and communicating opportunities for enhancement.

A clear understanding of the context within which the structure sits, that can influence the designer's aesthetic response, should be developed and recorded.

These will include:

1. topography
2. the historic character and function of the landscape and its relationship to heritage assets
3. ecology/biodiversity and their relationship to historic and current land use;
4. required function;
5. adjacent land use and infrastructure features;
6. the presence of other highway structures (either adjacent to or along the route);
7. geotechnical and geological characteristics;
8. views of or in the case of bridges, from the structure, and their wider and dynamic and historic and habitat context;
9. community values and objectives.

The design process should not start with any preconceptions about the final solution. The key objectives for the design outcome should be developed and defined through a multi-disciplinary review process, focusing on aspects such as:

1. integration of structure scale within the landscape;
2. proportions of spans and height;
3. symmetry/rhythm;
4. potential for developing a family of structures along a route.

Wildlife bridge/crossing design

- Wildlife bridges/crossings should respond to ecological survey data and impact assessments.
- Detailed bridge/crossing design should be evidenced based and follow best practice guidelines. They should be designed for the ecological features (i.e. species and habitats) effected by the scheme.
- The evidence base and best practice will depend on the features using the bridge/crossing; however, detailed design should consider the following:
 - Type. The type of crossing (bridge or underpass) should be based on the needs of the ecological features and surrounding topography/landscape.
 - Location. They should be sited to mitigate impacts and maximise benefits for features effected by the scheme (e.g. at important bat crossing points)
 - Height. The crossing should be level with the ground on either side. This is especially important for bats.
 - Connectivity. Crossings should connect similar habitats on either side of the crossing.
 - Width. Crossings should be sufficiently wide to provide an effective crossing. This should consider habitat requirements, edge effects; noise, light and wind intrusion from the road.
 - Habitat type. Habitats on, and adjoining the crossing, should be suitable for ecological feature using the crossing. Where the crossing is providing mitigation for multiple features, with competing habitat needs (e.g. woodland and grassland), it should be sufficiently wide to accommodate both habitat types.
 - Habitat age and structure. Where habitat is created (either on or adjoining the crossing) it should be sufficiently mature before road construction begins.
 - Habitat management. There should be a management plan to maintain habitats adjoining, and on, the crossing in the long-term (e.g. cutting and removing grassland arisings, scrub management, etc).
 - Lighting. The crossing should be lit appropriately for the features using it. This is likely to mean no lighting.
 - Screening. Sufficiently high screening should be included on both sides to reduce the effects of light and noise.
 - Monitoring and evaluation programme. A fully funded (and ring-fenced) long-term programme should be planned to evaluate the efficacy of the crossings and inform future designs.

Design thoughts with respect to the locations

Emma's Grove crossing

- We are in agreement that this crossing is now in the right location and will provide safer access for users of the Cotswold Way National Trail and better links to other trails. At just 5m width, thought will need to be given to final design to avoid conflict between the different user groups (including disabled users) for walkers, cyclists, horse-riders and periodic movement of cattle. It is also important to give consideration to how, in particular, horse-riders and cyclists approach

and leave the crossing to join existing bridleways and therefore minimise damage to priority habitats and wildlife by going 'off piste'. The structure's aesthetics is also very important as the bridge will, for many, feel like the gateway to the Cotswolds National Landscape. We wish to highlight that this bridge provides no ecological connectivity, and therefore, increased fragmentation of the SSSI caused by widening of the road will need to be mitigated in another way.

Shab Hill crossing

- Should be a mosaic, primarily of calcareous grassland but with hedgerows along each length to disperse wind and low-density scattered scrub/trees to provide functional connectivity for bats
- woodland to the west side of the carriageway is a small isolated component of secondary woodland, so expanding and connecting this to the woodland on the east should not be prioritised over expanding and connecting grassland habitats via the crossing.
- Based on the current wider land use the only way to potentially provide functional connectivity is for the bridge to act as a core stepping stone, which means ideally it will need a habitat corridor of 50m+ in width
- An effective corridor width is related to the distance from core areas, a narrower bridge may be sufficient if stepping stone areas of calcareous grassland (above the minimum viable patch size) are created both 350m west and 500 m north.
- Even with the stepping stones, a minimum undisturbed habitat corridor of at least 25m width is still needed over the Shab Hill crossing to provide functional connectivity.
- Evidence that small grassland verges on main highways benefiting invertebrates and grassland plant has been questioned by recent research.
- There must not be a barrier of woodland between the bridge and Crickley Hill to the north or Barrow Wake to the west. A corridor of open habitat should be maintained in both directions.
- The bridge needs to be designed and 'landscaped' in such a way that it helps to minimise the adverse landscape and visual effects of the road (e.g. through appropriate hedge / tree planting on the bridge helping to screen the road for receptors on the bridge and on nearby public rights of way / access land, etc.).

Cowley Crossing & Stockwell crossing

- Any greening features are good but not a strong preference for habitat type.
- Needs to provide woodland connectivity between the two core areas identified in the NRN
- Same point applies as above regarding appropriate hedge / tree planting to help screen the road for receptors on the crossings and the approach to the crossings.

3.2 Coordination of disciplines within the design process

To be decided upon in discussion with Highways England

3.3 Collaboration between all relevant disciplines

To be decided upon in discussion with Highways England

4 The Parts

4.1 Superstructure

Once the function of the bridge is determined fully, the form of the bridge whether girder, arch, cable-stayed or suspension can be designed to satisfy its given function. As the function of the bridge in relation to specific user groups such as pedestrians, cattle, horses and agricultural vehicles has not been fully determined, together with predicted numbers it is not possible to comment on the specifics of design. This information is fundamental when developing designs and will have a significant impact on how well

the structure sits within its landscape context.

Sections 4.1.1 – 4.3.7 below can only be considered once a fully detailed specification of what the functional requirements of the bridge are has been developed. This design brief can only be commissioned when this information has been provided. Their form should be underlined with clear explanations of whether there is scope for change.

4.1.1 Bridge deck depth

4.1.2 Bridge deck width

4.1.3 Bridge deck length.

4.2 Substructure

4.2.1 Piers

4.2.2 Abutments

4.3 Details

4.3.1 Surfaces and weathering.

4.3.2 Joints

4.3.3 Parapets

4.3.4 Drainage

4.3.5 Lighting columns and other deck furniture

4.3.6 Light and shade

4.3.7 Colour and tone

4.4 Design Outcome objectives

4.4.1 Connectivity

The Emma's Grove bridge will provide essential connectivity for the visitors to Crickley Hill and Barrow Wake and the Cotswold Way, the NT's Belted Galloway cattle and colleagues and contractors who manage the landscape. The Shab Hill, Cowley and Stockwell over bridges will also provide the necessary connectivity between local communities across the wider Cotswolds landscape

4.4.2 Proportion and integration of structure scale within the landscape

The ultimate objective of the bridge designs is to produce a safe, elegant, functional and contextual bridges that satisfy all functionality requirements, at a cost that is acceptable. The design must be natural, simple, original, and harmonious with its surroundings. Aesthetics should not be an additional consideration in the design but an integral part. Both the structural configuration and the aesthetics of the bridges must be considered together during the conceptual design stage. With this in mind there are two options for the design of the bridge in terms of visual representation. One solution is that the bridges hide within the landscape by reflecting natural context such as curves, form, materials and textures. The alternative option to this is for the designs to act in absolute contraposition with their surroundings and context and become stand-alone pieces of architecture and engineered design.

4.4.3 Options for contrast/harmony with surrounding environment

In general, aesthetics is about proportion, balance, and harmony. People have historically been immersed in nature most of the time and are accustomed to nature's simplicity. In order to arrive at the most sensitive structure, the best method is simplifying the structures as far as feasible and not to over engineer.

4.4.4 Proportions of spans/length and height

To be determined by the structural and functional requirements

4.4.5 Symmetry/rhythm/line/order of principal elements

To be determined by structural and functional requirements

4.4.6 Materials and finishes

The design of the bridges should be in line with Cotswolds Conservation Board Guidance, specifically the Cotswolds AONB Landscape Strategy and Guidelines. The Landscape Strategy and Guidelines provides a set of guidelines for each Landscape Character Type (LCT), with the relevant LCTs being LCT 2 (Escarpment), LCT 7 (High Wold) and LCT 8 (High Wold Valley). The guidelines for LCT 2 and LCT 7 have a section on 'major road construction and improvement schemes' (Sections 2.7 and 7.11 respectively).

The guidelines for all three LCTs also have a section on 'road upgrading and improvements' (Sections 2.8, 7.12 and 8.10 respectively). These sections do not specifically refer to bridges. However, from these guidelines, the most relevant recommendations relating to bridges would appear to be:

Refer to DMRB Vol 10 for general environmental design guidance.

Conserve the rural character of the local road network.

Promote use of design and materials appropriate to local character.

Produce guidance on design and suitable materials.

4.4.7 Parapets and other elements that contribute to rhythm

To be determined with respect to user needs.

4.4.8 Lighting and signage –

To be determined. It should be minimised and directioned to limit light pollution.

4.4.9 Managing the effects of water and weathering

To be determined from information supplied by HE.

4.4.10 Structure curtilage

To be determined. This will significantly influence the degree to which landscaping can mitigate. Clarity is required.

4.4.11 Viewpoints from and to the structure – key thoughts

The visual impact (and perception / experience) of the bridges for people using the local public rights of way, including the bridge crossings, and visiting local viewpoints is a more important consideration than the visual impact / perception / experience for people using the road.

The visual impact (and perception / experience) for people using the nationally significant rights of way (such as the Cotswold Way National Trail) and visiting national significant heritage assets (such as Crickley Hill hillfort), would be particularly important, followed by regionally significant rights of way and viewpoints such as the Gloucestershire Way and Crickley Hill, respectively. This prioritisation is consistent with the value allocated to different types of visual receptors in Landscape and Visual Impact Assessments.

The Cotswold Way crossing, through good design, could make it clear to road users coming up the escarpment that they are entering the nationally important landscape of the Cotswolds.