Roads and the environment
Putting an innovative approach at the heart of RIS2

www.bettertransport.org.uk
Foreword

William Rees Jeffreys was a remarkable man in many ways, not least for the trust fund he established to continue his life’s work – which ran far beyond his interest in the engineering, design and construction of roads. He was as concerned with aesthetics as he was with the business of getting traffic from A to B. Indeed his trust deed specifically mentions encouraging ‘the improvement of existing … public highways … such schemes being planned to secure the maximum of safety and beauty’. Had he been writing today, rather than in 1950, we can confidently say that he would also have referred to environmental sensitivities in that context.

It was for those reasons that the Trustees commissioned this report from Campaign for Better Transport and now commend it to Highways England and to others who have a responsibility for highway stewardship. It is not intended to be a prescriptive ‘workshop manual’, rather it is a source book of ideas for making our roads, old and new, fit more sensitively into the landscapes and ecosystems through which they pass. We hope that it will help to inspire a new generation of highway engineers to think beyond the engineering basics, thus following in the footsteps – perhaps more appropriately the tyre tracks – of Rees Jeffreys himself.

About the Rees Jeffreys Road Fund

David Hutchinson
Chair of Trustees
Rees Jeffreys Road Fund

William Rees Jeffreys (1872 – 1954) established the Road Fund that bears his name in 1950, with one of its priorities being to encourage improvements to roads and their design.

Today, the Rees Jeffreys Road Fund helps fund training, research and projects to improve the highway network and the roadside environment with the aim of promoting and securing better and safer roads in terms of design, engineering and aesthetics including enhancements of the experience of road users.

We are grateful to the Trustees of the Rees Jeffreys Road Fund for supporting this project.

About Campaign for Better Transport

Campaign for Better Transport is a leading charity and environmental campaign group that promotes sustainable transport policies. Our vision is a country where communities have affordable transport that improves quality of life and protects the environment.

An independent charity, we work by providing well-researched, practical solutions to transport problems, in support of better public transport, walking and cycling, for the sake of communities and the environment.

Campaign for Better Transport has been engaged as an active stakeholder during the development, delivery and monitoring of the Road Investment Strategy. In particular, we participate in the Highways England (HE) Design Panel, the HE Vulnerable Road Users Committee, Transport Focus’ Road User Panel, and with other NGOs on the advisory group for HE Designated Funds.
1. A vision for greener roads

England’s Strategic Road Network (SRN) is large and busy. Planned and built over many decades, it currently consists of 4,400 miles motorways and trunk ‘A’ roads. From Cornwall to Northumberland, it has sections in virtually every county. It passes through a huge variety of land-uses from major cities to open countryside. Although it represents less than three per cent of England’s total road length, it carries a third of the traffic.

To function effectively, Highways England’s (HE) management of the SRN needs to be as varied and diverse as the environments it passes through. For both existing and planned roads, a multitude of concerns need to be taken into account on every route. There are communities and businesses, protected landscapes, rare habitats, dark skies, river catchments and much else besides.

It is a challenging task, but one there may now the appetite and means to tackle. In 2015, Roads Minister John Hayes lamented how we have come to design and manage our roads.

“We grew to accept that roads and motorways must be an ugly necessity that we had to bear.”

In response, Hayes set the challenge that roads could and should be beautiful and argued for a revival of good design in transport planning. At the same time, the Government began a new approach to the SRN. Five-year Roads Investment Strategies (RIS) set out plans for HE both to develop the network and to improve the way it is designed and maintained.

We recognise that some of the ideas in this report potentially involve a greater degree of roadside activity, for example in managing planting along verges. It is important for those designing schemes, new roads or ‘green retrofits’ always to have in mind the need to promote the safety of those who use and those who maintain and manage the roads and roadside environment. In all cases a sensible balance needs to be struck, but the better the understanding of the environmental options the better that balance is likely to be.

The focus is on existing roads, not just the design of new schemes to add capacity, but the opportunities to augment maintenance schemes and revisit places where relatively modest environmental initiatives can make a big difference. It also sets out where barriers exist that need to be overcome and most important, it aims to show how our main roads can be made better for all:

- For road users – roads which are safer and more aesthetically pleasing to travel
- For communities – roads which are less intrusive in both noise and visual impact
- For conservation – roads which are better adapted to the environment and landscape, and less damaging to habitats across air, water and land
- For wider society – a SRN that works for those who rely on it while allowing ecosystems to function.

1.1 Principles for greener roads

For policy makers
- Current interventions are beginning to bear fruit. Designated funds have been invaluable in stimulating cultural change and providing a space where such approaches can be included. However, much more can and should be done to streamline the bureaucracy and build greater awareness within and beyond HE
- Funds are currently operated vertically (from strategy to frontline via regions) but could also work horizontally (strategic projects, regional projects, community fund level)
- The Design Panel is at a critical moment where it can move from developing principles to driving their application on the ground, but this needs proper resourcing, including better join up with the HE environment fund, particularly the landscape and legacy strands
- The forthcoming review of the Design Manual for Roads and Bridge, and the development of the expressway model are an opportunity to embed green infrastructure and good design.

For project engineers
- Badly designed roads are bad for everyone - poor design does not just damage the environment, it hits network resilience and driver wellbeing, too
- Work on innovation, technology and future proofing should also look for opportunities to achieve environmental goals and improve the user experience.

For area managers
- Grasp the opportunity - The SRN offers great potential for positive impacts from good design and greening the network beyond simply mitigating adverse impacts
- Learn from best practice - Green infrastructure has proven potential to deliver improved environment around roads and to deliver long term resilience benefits to the network - there are many good examples from the UK and around the world
- There are some excellent examples of good practice, particularly around biodiversity, which could be shared in scalable ways for both new schemes, third party schemes and retrofit
- To deliver new ideas in practice, HE needs to show leadership, review contracts and specifications to embed these approaches in business as usual: contractors and supply chain will then respond to the specification.
2. Making the vision a reality

New road projects and works to roads in highly sensitive locations often include significant funds for environmental mitigation. In contrast, existing roads are rarely a priority for environmental enhancements. Yet there is great potential for packages of smaller interventions to make a difference.

This report advocates an approach based on the concept of ‘green retrofit’: that is, a programme of retrospective review and enhancement of existing roads, with the aim of improving the environment for road users, while reducing the road’s impact on the environment.

Our site case studies illustrate how such a green retrofit could work:

2.1 A27 South Downs
2.2 M60 Greater Manchester
2.3 A14 Cambridgeshire

2.1 A27 Corridor South Downs

A busy road corridor skirting the South Downs National Park, the A27 presents a number of opportunities for environmental enhancements to restore a sense of place, some of which we illustrate in this section.

Falmer Village

Falmer is bisected by the road, with the village pub to the north and the village pond to the south, and an unattractive retaining wall and footbridge. The parallel railway through the same section runs through a tunnel. Longer term, covering the road to reunite the village and screen road noise could be funded by building new homes above the covered road.

In the short term, there is potential to enhance the appearance of the concrete retaining wall and metal footbridge with planting combined with use of local stone. The crash barrier could be painted to blend better with the foliage, without loss of functionality. The narrow bus bay could be improved and the road resurfaced with noise reducing material.

1. Clad concrete wall with stone or screen with planting
2. Paint crash barrier to blend with planting
3. Enhance bridge with planting or stone cladding
4. Widen bay to allow safe usable bus stop
5. Resurface road with noise absorbent material.
**Green Ridge**

As the A27 approaches Brighton at Green Ridge, the road is well-screened by trees, but is still very noisy with major lighting impacts on the surrounding area. The bridges have unattractive concrete and grey metal construction and the verges are scrubby. This stretch of road could benefit from noise absorbing surfacing, a review of lighting to reduce the number and height of columns, more attractive verge planting and a green retrofit of the bridge to better suit its wooded setting.

1. Enhance bridges with planting or camouflaging paint
2. Paint crash barrier to blend with foliage
3. Enhance verge with native species planting
4. Review number and height of lighting columns
5. Paint crash barrier to blend with foliage
6. Resurface road with noise absorbent material.

**Stanmer Park**

This section of the A27 at Stanmer Park cuts across the National Park landscape, with adverse impacts on biodiversity and noise. The road is in a partial cutting, creating a microclimate that often leads ice to form, with consequent risk of crashes. Greater use of tree planting and soft landscaping would reduce noise impacts and reduce the risk of icing.

In the longer term, putting the road in a tunnel at this section would reconnect Stanmer with Coldean and the city, reconnect the two sections of National Park cut off by the current road, and reduce the noise impact on Stanmer Park. A cut and cover tunnel would provide additional land that could be used for university student accommodation or other housing, to help fund the project.

1. Enhance bridges with planting or camouflaging paint
2. Enhance verge with wildflower planting
3. Locally native planting closer to road side to cut noise and warm against icing
4. Paint crash barrier to blend with foliage
5. Resurface road with noise absorbent material.
A27 Southerham near Lewes

The A27 junction at Southerham is dominated by pylons and lighting. The road surface is patchy with concrete and an unattractive low median separating the lanes. This stretch of road could benefit from noise absorbing surfacing; a review of lighting to reduce the number and height of columns; and more attractive verge and median planting. Highways England could work with National Grid to explore the potential to sink the powerlines beneath the road.

1. Take power cables under the road
2. Enhance median with wildflower planting
3. Consider additional planting on roundabout
4. Review number and height of lighting columns
5. Paint crash barrier to blend with foliage
6. Resurface road with noise absorbent material
7. Review signs and remove any redundant or temporary signs.

2.2 M60 Greater Manchester

An urban motorway ring road, passing close to people’s homes, the M60 will have impacts on air quality, noise and sense of place. Concerns over peak-time congestion have led to increased use of smart motorway features including gantry-mounted variable signs.

Reviewing the hard infrastructure and increasing the proportion of green infrastructure could combine to create a significantly more attractive corridor, with no loss of network safety or capacity. There is also potential to enhance habitats in the planted buffer zones, helping deliver the priorities set out in the Greater Manchester Biodiversity Action Plan.

The illustration below shows a section of the M60 at Stockport to the south of Manchester city centre.

1. Reinforce tree screen to reduce noise to neighbouring homes
2. Consider wildflower planting to enhance verge
3. Use noise absorbent road surface
4. Seek a slimmer gantry design
5. Add planting and sustainable drainage in central reservation
2.3 A14 Cambridgeshire

Road widening schemes inevitably have some adverse environmental impacts, yet also offer potential for environmental enhancement.

HE has begun work on a £1.5 billion scheme to re-route and widen the A14 between Cambridge and Huntingdon. The stated objectives are to relieve congestion, support economic growth, connect communities and improve the environment. The project is due to be completed in 2020.

The project consists of:
- A new 12.5 mile Huntingdon Southern Bypass constructed as a new section of the A14. This will predominantly be a three lane dual carriageway and will include a raised viaduct across the river Great Ouse.
- Approximately 5.5 miles of the existing A14 near Cambridge will be widened to four lanes in each direction with a parallel access road constructed.
- Junction capacity increases to make the road compatible with new development sites and access and connections for cyclists, horse riders and pedestrians.
- The A1 between Brampton and Alconbury (3.5 miles) will be widened to a three lane dual carriageway.
- The existing A14 will be de-trunked between Huntingdon and Swavesey and between Alconbury and Spittals interchange, with responsibility passing to the local authority.

The A14 scheme aims to be an exemplar in mitigating the impact of the new road. Measures planned for include:

Net gain in habitats

This area around the A14 features Biodiversity Action Plan priority habitats of grazing marsh, lowland meadow, and fen. Cambridgeshire and Peterborough Biodiversity Partnership has identified that such habitats are now rare because of intensified agriculture and the loss of the land to development. Such habitats are very difficult to re-create.

Plans for major habitats creation include the 271 hectares of new wildlife habitat over 18 locations. The viability of this objective may rest on the use the borrow pits are put to after material has been extracted for road construction. This may include the creation of new habitat, the design of which could support local conservation and public access objectives.

Community engagement and legacy

Some of the initiatives are being delivered through a £400,000 Community Fund which was established in 2016. This aims to support locally-led initiatives in and around the project area and is overseen by HE. It offers revenue and capital grants of up to £10,000 to local not for profit groups across a broad range of works including:

- Local environmental improvements from streetscape improvements to wildlife conservation and flood prevention.
- Projects to reduce vehicle use and promote cycling, walking and other non-motorised users.
- Arts, culture & heritage projects.
- Community involvement and safety projects.

Grants distributed so far have supported projects ranging from habitat creation, a community shop, a community orchard, art work at a local primary school and support for sustainable transport from cycle parking to research into the development of safe cycling routes.

Further mitigation of the new Ouse Valley crossing could be carried out to reduce the fragmentation and severance of existing habitats. This should not be limited to land HE has responsibility for managing. Sites further afield should be considered where these can create a network of habitats.

The proactive engagement around the A14 scheme draws into focus the weaker involvement of stakeholders in management practice across the rest of the network. HE needs to identify and maintain a sustainable approach to land management across its network, not just on new schemes.

Even on new schemes, not all the HE network is suitable or relevant for improved conservation work. For example, some road verges are unsuitable for wildflower planting because the land adjacent is intensively farmed and has high levels of nitrate input.

Highways design requirements and guidance are contained in the multi-volume Design Manual for Roads and Bridges (DMRB) which is due for a comprehensive review during the second Road Investment Strategy (RIS2). This review provides an opportunity to embed the environment within the DMRB.

While there are some sections addressing the road side environment, for example DMRB volume 10, overall the DMRB provides nowhere near enough advice for highways engineers to make informed decisions on environmental maintenance.

There are opportunities for HE to be creative - for example, Lincolnshire County Council has been looking at using hay cut from its roadside verges as biomass - the income it generates could create a self-sustaining management regime.

Landscaping around road schemes does not need to be expensive or high maintenance. In some instances there can be habitat benefits from leaving land in its worked state rather than aiming to recreate the soil profiles that existing before development (as recommended in the DMRB).
2.4 Other potential locations

Other potential priority locations for such intervention could include:

A1 Cambridgeshire (from A428 to A14), a dualled section of road that runs through small towns
Impacts include: severance, noise, water pollution from run-off
Potential: opportunity to work with Network Rail East Coast Main Line to understand and respond to some shared habitat impacts

M2/A2-M20, Kent, partially dualled sections which hem in the Kent Downs AONB
Impacts include: landscape, noise
Potential: tree and hedgerow planting for natural screening

A160 Lincolnshire, a short new section of dualled road linking to Immingham Docks
Impacts include: habitat erosion and despoiled environment
Potential: improved management of hinterland support improved biodiversity

A38 Haldon Hill, Devon, dual carriageway severs the AONB with high levels of deer collisions
Impacts include: wildlife loss, landscape severance
Potential: Green bridge planned, opportunity for best practice pilot, good stakeholder engagement

A64 (M) Leeds, urban motorway
Impacts include: air pollution, severance, noise
Potential: use of green walls, planted barriers, covered sections

2.5 Summary of recommendations

This report sets out a number of specific interventions and policy changes that combine to offer both a vision of greener roads and some practical steps to achieve that vision.

3 Towards a better roads environment

- Highways England (HE) could classify sections of the network as red, amber, green in terms of environmental quality and the need for enhancement.
- HE could include environmental quality in its state of the network reports.

4.1 Funding

- Mainstream project budgets should include an allocation for environmental enhancements and maintenance.
- Alongside allocations via HE regional teams for SRN projects, designated funds should include an allocation for strategic projects held nationally and an allocation for 'community funding' grants with a light touch process.
- There should be a designated funds representative on the Design Panel, or officer in attendance, and vice versa, with a Design Panel member or officer attending designated funds advisory groups.

4.2 Performance metrics

- RIS2 should focus on outcome-based performance indicators.
- There should be indicators for visual impact as well as noise and biodiversity.

4.3 Design guidance: role of the Design Panel

For new roads:
- Advising on best road location, alignment and form at option identification stage.
- Setting design objectives for the project.
- Having a design champion for each project to ensure that design standards are maintained.
- Conducting a post-opening design review.

For the existing road network:
- Applying the design principles to the DMRB review.
- Develop design guides for specific features such as bridges, emergency rest areas, gantries, or barriers.
- Appointing a design champion for each corridor to incorporate place-responsive design, local materials etc. into design guidance.
- Promote a design-focused culture which looks for design wins from business as usual safety, maintenance and renewal projects.
4.4 Benefit-Cost Review (BCR) and appraisal

- Further work should be done exploring the potential to include approaches such as Natural Capital Accounting, payments for ecosystems services or resource rental in project cost-benefit appraisals
- The environmental benefits should be quantified and included in future Post-Opening Project Evaluation (POPE) assessments.

5.1 Lighting, signs, gantries

- Expand use of cantilever signs instead of gantries at sensitive locations
- Make wider use of different paint colours on cantilevers and gantries
- Conduct periodic reviews of gantries and signs as part of corridor plans
- HE should keep the requirements for gantry-mounted equipment under review
- HE should develop a hierarchy of sites for light sensitivity
- Greater use should be made of timed and motion sensitive lighting, and smaller lighting columns
- RIS2 should extend the use of LED lighting across the network
- There should be an enhanced budget for sign audit, repair and replacement.

5.2 Emergency Refuge Areas (ERAs)

- HE should continue to explore the best way to make ERAs visible while reducing their adverse visual impact
- The Design Panel could be asked to help develop guidance on ERA design.

5.3 Medians and barriers

- HE should develop or commission a crash barrier design that allows permeability while meeting safety requirements
- HE should develop a palette of materials and paint colours for use in different locations, with advice from the Design Panel.

5.4 Bridges

- HE should develop a ‘how to’ guide for new green bridges and for green bridge retrofit with support from the Design Panel
- Green bridge guidance should be included in the forthcoming revision of the DMRB
- Improving the appearance of existing bridges and underpasses should be integral to maintenance programmes
- The environment fund should be used to pump prime greening of bridges at priority locations, including match funding landowner contributions.

5.5 Tunnels

- HE should develop a ‘how to’ guide for cut and cover retrofit with support from the Design Panel
- RIS2 should identify some locations for pilot use of cut and cover tunnels to retrofit existing roads
- The environment fund could be used to pump prime action at priority locations, including match funding landowner contributions.
3. Towards a better roads environment

Roads impact through their location, form and alignment; through their design and accompanying infrastructure; and through their operation, maintenance and usage. The extent and nature of these impacts can be changed significantly by how the design of the road is approached.

Just as there can be cumulative negative impacts from a single poorly designed road on landscape, natural habitats and noise, so a well-designed or retrofitted road can deliver multiple benefits. Quantifying these benefits in the context of conventional benefit to cost ratio (BCR) analysis is a challenge, but advances in valuing green infrastructure offer an opportunity for a fresh approach.

The SRN Initial Report setting HE’s priorities for RIS2 echoes this: “Our aspiration is not just to minimise harm, but to run a network which works harmoniously with its surroundings to deliver an overall positive impact on the environment… Investment in the network can present an environmental challenge, but also provides a huge opportunity to deliver a network that works in greater harmony with the environment than in the past.”

The SRN does not sit in isolation: there is a real opportunity to join up environmental work with work on the rest of network and in partnership with other landowners and stakeholders so as to maximise the benefits of the kind of interventions outlined in this report.
However there is potential for the management of the road network, and investment in the surrounding landscape, to enhance provision for wildlife, and reverse the decline in biodiversity. The soft estate of the Strategic Road Network is roughly the same size as the Norfolk Broads, and the management of network has impacts beyond its boundaries.

CIRIA (the Construction Industry Research And Information Association) has identified good practice principles for Biodiversity Net Gain in infrastructure developments:

1. Apply the Mitigation Hierarchy
2. Avoid losing biodiversity that cannot be offset by gains elsewhere
3. Be inclusive and equitable
4. Address risks
5. Make a measurable Net Gain contribution
6. Achieve the best outcomes for biodiversity
7. Be additional
8. Create a Net Gain legacy
9. Optimise sustainability
10. Be transparent

HE is currently delivering the first Road Investment Strategy (RIS1) which runs from 2015-2020. Among the operating requirements in RIS1, Highways England was to develop a Biodiversity Strategy and action plan. The HE biodiversity plan (published in June 2015) contains five specific outcomes, with a series of related actions, designed to provide support for biodiversity across the network:

- Outcome 1: Highways England and our suppliers are equipped to produce good biodiversity performance
- Outcome 2: The Strategic Road Network is managed to support biodiversity
- Outcome 3: We have delivered biodiversity enhancements whilst implementing a capital programme of network improvement
- Outcome 4: We have addressed the legacy of biodiversity problems on our network via a targeted programme of investment
- Outcome 5: We are fully transparent about our biodiversity performance.

The HE estate has great potential to support and deliver improved biodiversity alongside its operational functions. Natural England calculates that the woodland component of the SRN is around 11,900 hectares.

The specialist conservation charity Plantlife has conducted research into the importance of verges for biodiversity and found that many of the last habitats for rare or endangered plant species are at the roadside. They have identified that over 700 species of wild flower are known to grow on road verges in the UK, representing nearly half of the nation’s flora.

There are many examples of good practice, including the A27 Brighton bypass, where the Highways Agency worked with an expert local horticulturalist to source appropriate wildflowers to plant, and the designation of road verge nature reserves in some locations in partnership with local highways authorities.

There is great potential for wider use of green infrastructure on the SRN, for example using natural interventions such as sustainable drainage systems (SUDS) and tree planting to address challenges of flooding, verge stabilisation and pollution control.

**Case study: understanding tranquillity**

The 2007 CPRE study of tranquillity provides a consistent method for quantifying the level of tranquillity and how this changes over time. This approach maps England into 500 m grid squares, and assigns each one a score based on a number of factors which can have a negative or positive impact on tranquillity. Positive impacts on tranquillity include the extent of natural landscapes, water, wildlife and open spaces, while negative impacts include urban development, transport noise, light pollution and power lines.

This approach has been used to prioritise areas to be protected from new development. It could also be used to prioritise areas to reduce the impact of noise from existing roads.

**Recommendations:**

- HE could classify sections of the network as red, amber, green in terms of environmental quality and the need for enhancement
- HE could include environmental quality in its state of the network reports
- HE, with support from the Strategic Design Panel, could develop a green retrofit manual bringing together best practice approaches to environmental enhancement of existing roads
- A green retrofit approach could be made a standard part of any road renewal scheme.

There is also potential to have positive impacts through improved design and maintenance of road infrastructure as well as greater use of green bridges, underpasses and tunnels in the most sensitive areas.

### 3.2 Habitat impacts

The presence of roads, hard engineering in the natural environment, will inevitably have an impact on habitats and biodiversity. The construction of roads causes fragmentation of sites and may involve the destruction of irreplaceable habitats. The operation of roads, with the associated noise and pollution, can lead to the further erosion of environmental quality, made worse by hostile maintenance regimes.

**Case study: low impact verge maintenance**

Plantlife has explored the risks and opportunities for biodiversity from verge maintenance regimes, and produced recommendations for responsible maintenance.

Delaying the first cutting date of lowland grassy verges from early spring to late summer helps support plant lifecycles, and also reduces maintenance costs. Planting native species such as Yellow Rattle adds visual interest to verges and contributes to natural weed suppression.

Noise impacts

Noise has significant impacts on human health, wildlife and rural tranquillity. It is also a major concern to road users. While technological changes have reduced noise from vehicle engines and tyres, a trend that is likely to continue with electrification, there remains the problem of noise from interaction with the road surface, something individual road users are powerless to change.

The level of noise is affected by the choice of materials, where noise reduction is not always the priority in specifications, despite the importance of this issue to road users and roadside communities. Longevity is desirable as more frequent road resurfacing brings attendant disruption and costs, but should not be the only priority. Making use of noise reducing surfacing the norm could have a transforming effect for people and places.

**Recommendations:**

- HE could classify sections of the network as red, amber, green in terms of environmental quality and the need for enhancement
- HE could include environmental quality in its state of the network reports
- HE, with support from the Strategic Design Panel, could develop a green retrofit manual bringing together best practice approaches to environmental enhancement of existing roads
- A green retrofit approach could be made a standard part of any road renewal scheme.
4. Delivering the vision

4.1 Funding and financial support

The second Road Investment Strategy (RIS2) will run from 2020–25, with a budget and operational requirements set by government. There is a commitment to fund RIS2 from the proceeds of Vehicle Excise Duty. The prospect of a dedicated roads fund in RIS2 and beyond gives a degree of funding certainty which other highways authorities and other infrastructure providers do not have.

This allows greater potential to earmark funds for improved design and green retrofit. The aim of the designated funds in RIS1 was to identify and embed good practice that would become part of ‘business as usual’ in the future.

Embedding good practice into business as usual is highly desirable, and should be reflected in mainstream budgets in RIS2. In Australia, for example, environmental measures typically amount to 15 per cent of total project costs.4

In establishing HE, the Government gave it licence to spend off network so as to achieve a better all-round outcome, and this is particularly appropriate for environmental enhancements where the impact and the benefits may come from interventions beyond the red line of the SRN estate.

There is still a strong case for maintaining the designated funds for additional spending on environmental improvements. The designated funds were announced as part of the Road Investment Strategy in 2014: they include money set aside for work on air quality, cycling, access, and the environment: other funds cover innovation, housing and growth, bringing the total to £900 million. These ring-fenced capital funds should be spent on projects that go beyond business as usual. For example, the funds should not go on routine maintenance or necessary safety measures.

The environment designated fund has £300 million to be spent over the five years of RIS1 specifically to achieve better environmental outcomes. This includes £30 million for the HE biodiversity plan goal to deliver no net loss of biodiversity by 2025, with a focus on better management of the road network and new habitat creation. The environment strategy published in April 2017 has an allocation of £225 million for ‘a strategic road network working more harmoniously with its surroundings to deliver an improved environment.’ It focuses on tackling noise, water quality and drainage as well as wider biodiversity and landscape impacts.

Case Study: A590 Morecambe Bay Green Transport Corridors Project

This project brought together specialist NGOs, highways contractors and local volunteers to enhance and restore 13.5 hectares of roadside vegetation along the A590 in Cumbria, providing important connections for Sites of Special Scientific Interest surrounding the road.

The project is creating and restoring species-rich grassland and woodlands, and planting new hedgerows, creating a more attractive roadside environment. The volunteers collected woodchip and logs from scrub clearance for community use. Habitat management is designed to maximise ecological benefits and reflect the character of the landscape. By developing sustainable land management practices, it will be easier for Highways England and other landowners to maintain the stewardship of these sites for the future.

The project shows how management of the green infrastructure on the highways soft estate can contribute significantly to biodiversity and could help Highways England to deliver its biodiversity ambitions for no net loss by 2025 and net gain by 2040.

In the SRN Initial Report, HE proposes a combined wellbeing and environment fund that covers human wellbeing, and the natural, built and historic environment.

Designated funds have been invaluable in stimulating cultural change within Highways England and providing a space where such approaches can be included. There have been several examples of good practice including the green bridges on the A556 Knutsford to Bowdon (described in section 5.4 on green bridges), which provide excellent costed and scalable examples of what can be achieved. Working in partnership can deliver significant benefits for the road network, biodiversity and local communities.

Case Study: Friends of the Peak District

Friends of the Peak District have participated in two schemes for environmental mitigation - the National Grid Visual Impact Project for pylons and the Highways England environment designated fund. The National Grid process is open with information and transparent about judgements. In contrast, the Friends experience with the HE’s fund management is that it appears ‘lacking in transparency, inaccessible, bureaucratic and poorly communicated.’

They found that the funding criteria were confusing: ‘improvements to the environment of existing and new schemes appear muddled together making it difficult to identify exactly what the fund would be spent on.’ Project proposals are assessed against the fund criteria, but ‘who undertakes the required assessment and how is not made clear.’ Highways England appeared reluctant to consider environment funding for projects which might be included in future road schemes, with little or no feedback on suggestions from the local group.

This may be an untypical example but it clearly indicates room for improvement as the funds mature in RIS2.

Despite these positive examples there have been frustrations, expressed from stakeholders ranging from environmental NGOs to local authority officers, that HE’s systems for approving and commissioning schemes are extremely complex and opaque unless you are one of the major contractors already in the loop. This makes it harder for HE to benefit from innovation and get on to mainstream new best practice.

There is clearly a pressing need for some light touch process to be developed for smaller schemes, and for streamlining and explaining existing processes. RIS2 could usefully develop a suitable process for funding small environmental schemes without undermining the rigorous assessment process for larger projects.

We were keen to understand how the experience of the National Grid scheme compared with the HE designated funds.

The success of some excellent partnership projects delivered with support from the HE environment fund shows the potential for positive outcomes across the network. However, to be as effective as the National Grid scheme, HE funds need to be much better publicised, with a more streamlined decision making process, more openness on how funds have been spent to date and better sharing of the lessons learned.

Funds are currently operated in a way we could characterise as vertical: a national strategy and approach for each fund is defined, with the funding allocated down to individual projects via HE’s regional structure.

An alternative approach would be to operate the funds by allocating budgets in three horizontal slices: a top proportion of each fund held at national level for strategic projects, that are exemplars or on a large scale; and a second tranche allocated to projects delivered by HE regional teams, as at present. The third layer of funds could be operated like a community fund with grants for small scale projects that may be delivered by partners, with a light touch application process, potentially administered by...
Case study: Improvements to Titford Pools, Oldbury, M5
This project was delivered in partnership with the Canal & River Trust. HE used funding from the environment designated fund to clean the polluted pools under the M5 flyover, remove sediment, recreate reed beds, restore the towpath and provide information for visitors.

The many benefits include better water quality, improved health and wellbeing for the local community and improvements to community severance caused by the M5.

Recommendations:
- Mainstream project budgets should include an allocation for environmental enhancements and maintenance
- Alongside allocations via HE Regional teams for SRN projects, designated funds should include an allocation for strategic projects held nationally and an allocation for community fund type grants with a light touch process
- There should be a designated funds representative on the Design Panel, or officer in attendance, and vice versa, with a Design Panel member or officer attending designated funds advisory groups
- The Design Panel should be given an overview of the landscape strand of the environment designated fund
- HE should explore using the legacy fund to endow maintenance of funded schemes.
- There should be annual reporting of how the funds have been spent with case studies to inspire future projects
- Each designated fund should have an advisory group including stakeholder and road user representatives
- Stakeholder engagement on the designated funds should be used to help identify priority locations for intervention on the network.

4.2 Design guidance
HE’s Strategic Design Panel brings together great expertise and great good will from its members.

At the midpoint of RIS1, the panel has produced its proposed design principles and Highways England has finally committed the resource to recruit a professional team to support its work as these principles are further developed.

The SRN Initial Report sets the goal that the strategic design panel’s vision and principles will be ‘implemented effectively whenever we renew or improve the network’.

Case study: National Grid Visual Impact Project
The National Grid has funding from OfGEM for mitigating the visual impact of power lines in the most sensitive locations (VIP project). OfGEM required development and publication of guiding principles for the funds, tested through public consultation. A stakeholder advisory group with an independent chair advises on key decisions and on how to involve other stakeholders on individual projects. There is an open process to identify and prioritise project proposals on a national basis, with sites scored against the published criteria.

There are two levels of funding with a funding pot allocated for small scale landscape enhancement projects that do not qualify for VIP funding. Again the process of allocating funds is robust. Initial bids to the landscape enhancement fund are assessed in detail by the grants officer and landscape advisors, with those meeting the criteria invited to submit full applications. Full applications are put to an approvals panel.

The independent panel, which is chaired by the Landscape Institute and includes experts from Cadw, Historic England, Natural England and Natural Resources Wales, then recommends selected projects to receive funding. The final decision as to which projects are funded is taken by OfGEM based on the recommendations of the panel. National Grid has produced a leaflet and website content explaining the scheme and produces annual reports covering all the VIP work.

Recommendations:
- Makes roads safe and useful
- Is inclusive
- Makes roads understandable
- Fits in context
- Is restrained
- Is thorough
- Is environmentally sustainable
- Is innovative
- Is long-lasting
- Is a collaborative process.

The Design Panel’s first progress report makes some useful recommendations for the future, which we endorse. These include:
- Clear and consistent consideration of design at the earliest stage of scheme development
- Building in greater flexibility to later stages of scheme design, within the constraints of the consenting process
- Emerging schemes to learn lessons from completed schemes and other parts of built environment sector
- Post-opening review to consider design principles.

The challenge is now to resource and deploy the panel’s expertise effectively.
If resourced properly, the Design Panel has great potential to deliver a design transformation across the SRN. In particular it should own the expressway design guidance.

For new roads:
- Advising on best road location/alignment at option identification stage
- Setting design objectives for each project
- Having a design champion for each project to ensure that design standards are maintained
- Conducting a post-opening design review

For the existing road network:
- Applying the design principles to the DMRB review
- Developing design guides for specific features such as bridges, emergency rest areas, gantries, or barriers
- Appointing a design champion for each corridor to incorporate place-responsive design, local materials etc into design guidance
- Promote a design-focused culture which looks for design wins from business as usual safety, maintenance and renewal projects.

### 4.3 Cost benefit and performance measures

While the focus of this report is on the delivery of environmental improvements, the appraisal framework at either end of projects will have an impact. Whether a project can proceed at all depends on its benefit-cost ratio (BCR) while its end results will be judged against the impact on HE’s performance indicators.

There are identified clear and quantifiable benefits from green infrastructure and a better aesthetic environment. Green infrastructure contributes to social and environmental sustainability, and returns on green infrastructure investment are high, with a growing body of academic work showing how these benefits can be calculated in monetary terms.\(^1\) By contrast, traditional scheme appraisal values minimising adverse environmental impacts but does not sufficiently look at valuing green infrastructure benefits.

Driving down supply chain and maintenance costs can be at odds with whole life costing, while the positive benefits beyond mitigation are insufficiently valued, risking depriving road users and roadside communities of positive interventions. In the built environment, environmental improvements are recognised as adding to the capital value of the asset and reducing its long term running costs. There is an opportunity to explore further how this can also be applied to infrastructure.

A review of how design and environmental benefits are included in infrastructure scheme appraisals would fit well with the growing importance of the green economy, and would assist with meeting the challenges of air quality and climate change. We believe there is potential from Natural Capital Accounting and/or payments for ecosystems services to be incorporated into project funding approaches.

Performance metrics can be valuable both to measure performance and even more to prioritise work, drive investment and encourage cultural change, where new ways of working, initially in response to a performance target, become mainstreamed. For RIS1, the two key environmental performance indicators monitored by the Office of Road and Rail (ORR) measured noise mitigation in noise important areas, and the publication of the Biodiversity Action Plan.

### Case Study: Sustainable drainage, Lancaster, Pennsylvania

The city of Lancaster in Pennsylvania adopted a green infrastructure approach, using sustainable drainage, to manage greywater and stormwater drainage. This delivers energy and carbon emissions savings from reduced volumes entering the sewer system. The project is estimated to have reduced infrastructure capital costs by $120 million and to reduce wastewater pumping and treatment costs by $661,000 per year. These benefits exceeded the costs of implementing green infrastructure in the area, which were estimated at around $51.6 million if integrated into planned improvement projects or up to $94.5 million if implemented as stand-alone projects.\(^4\)

### Case Study: UK National Forest

Environmental consultants EFTEC used natural capital accounting methods to assess the costs and benefits of the UK National Forest project over the period 1990 to 2100.

The total benefits came to €1,005 million whilst costs, including the grants, came to €210 million (€188 million). This means the benefits exceeded the costs by €795 million (£721 million) with a benefit cost ratio of 4.8 to 1. The benefits were also found to exceed costs by a factor of 2.6 to 1 over the 1990 to 2010 time period.

Adopting a wider range of performance measures would assist HE in focusing on improving the environment around the SRN.

However it is important that having an excessive number of targets is avoided as this could dilute rather than focus attention.

In the latest performance review, ORR advises that HE address the following performance areas, which complement the recommendations in this report:
- Put plans in place to improve performance against its targets on road user satisfaction and road condition
- Produce clearer plans for how it will meet its target to mitigate 1,150 noise important areas by 2020 develop
- Embed improved plans for how it delivers maintenance and renewals on the network.

The recent report *Rising to the Challenge* proposes a number of outcome based performance metrics for RIS2, including performance measures relating to landscape, habitat and noise.

### Recommendations:
- Further work should be done exploring the potential to include approaches such as Natural Capital Accounting, payments for ecosystems services or resource rental in project cost-benefit appraisals
- The environmental benefits should be quantified and included in future POPE assessments
- RIS2 should focus on outcome based performance indicators
- There should be indicators for visual impact as well as noise and biodiversity
- There should be a target for the percentage of mainstream HE budget spend on maintenance and environmental enhancement of the existing network.
5. Improving the design of core SRN infrastructure

The SRN environment comprises many elements which must meet operational and safety requirements. There is great potential to adopt new approaches to these building blocks, learning from best practice in the UK and abroad, to deliver a road network that is both high performing and also of high design and environmental quality.

5.1 Gantries, signs and lighting

RIS1 has seen the development of a new set of road ‘products’, Smart motorways. The design of Smart motorways is driven by functionality, and has introduced significant new infrastructure to existing roads.

There are various permutations of smart motorways, with the common requirement to convey variable speed and lane availability information to drivers. Smart motorways rely on gantries to hold and deploy camera and sensing technology, and digital signs for road users. These are significant structures in the landscape (large, numerous, illuminated, and arguably ugly).

In the lifetime of RIS1 and RIS2, gantries will continue to be a growing feature of the SRN. There is a great opportunity to improve gantry design. The design has evolved significantly in terms of becoming quicker to deliver and install, with great benefits to operational efficiency and cost. Now the challenge is to refine the design in terms of visual impact.

The design and deployment of gantries is driven almost entirely by the operational requirements and cost. There is little or no aesthetic or environmental aspect to design and procurement. A design competition for gantries could be an opportunity to inspire and share designs that combine function with improved form.

We have explored with supply chain experts whether gantries could be made slimmer. However unlike other products, gantries are becoming larger. Safety requirements for onsite maintenance mean that the latest generation of gantries are equipped with access ladders, walkways and cladding, adding to their bulk. Gantries and signs mounts are conventionally painted grey to minimise contrast against typical sky colour, but can appear intrusive against other backdrops including both natural and built landscapes.

Cantilevered signs are a much less intrusive option than portal gantries. They are also smaller and therefore cheaper to install, and safer to maintain with access from the roadside, unlike gantries that require catwalk access above the carriageway.

The main constraint on the use of cantilevers is the amount of kit that HE specifies must be mounted. A review of signs and signalling requirements could remove the need for many gantries, and such reviews could be part of regular corridor maintenance and renewal programmes.

**Case Study: Kier intelligent traffic lights**

Highways contractor Kier has worked with Pike Signals and A Plant to develop an intelligent traffic light system using Automated Remote Vehicle Actuation technology to manage temporary traffic lights based on the presence of vehicles. Such automation can minimise delays, reduce the land take for the worksite, and reduce energy costs. The pilot project has been deployed successfully in Somerset and on works for Bristol Water.

This approach could be transferred to the SRN to manage lighting and signals in light sensitive areas as well as tackling congestion in urban settings.

Making better use of Variable Message Signs could reduce the need for multiple fixed signs. In the longer term, there is potential to reduce the presence of gantries significantly, as new technology means that information will increasingly move in-car. Fully automated vehicles are unlikely to be the norm in the lifetime of RIS2, but greater connectivity and in-car information will increasingly feature. This gives the opportunity to have a planned strategy for gantry review and removal in RIS2 and beyond, and for gantry specifications to build in easy redeployment and recycling as of now. HE should keep the evolving requirements for gantry-mounted equipment under review with the aim of reducing it as technology develops.

Signs can be a poor relation in terms of maintenance budgets, with anecdotal evidence of damaged or missing signs being left unrepaired for months. There are easy gains from reviewing clutter, enforcing swifter removal of temporary signs and maintaining and enforcing restrictions on advertising signs. Improving the maintenance of signs would have practical as well as aesthetic benefits for road users and can be delivered by changing budgets and contract specifications to reflect this.

Making better use of Variable Message Signs could reduce the need for multiple fixed signs. In the longer term, there is potential to reduce the presence of gantries significantly, as new technology means that information will increasingly move in-car. Fully automated vehicles are unlikely to be the norm in the lifetime of RIS2, but greater connectivity and in-car information will increasingly feature. This gives the opportunity to have a planned strategy for gantry review and removal in RIS2 and beyond, and for gantry specifications to build in easy redeployment and recycling as of now. HE should keep the evolving requirements for gantry-mounted equipment under review with the aim of reducing it as technology develops.

Lighting

There is research evidence (from CPRE among others) on the effects of light pollution in rural areas and measures to tackle this. Having a hierarchy of areas for light sensitivity and a lighting management regime to respond appropriately to each locality (from ‘dark skies’ with minimal lighting to well-lit major junctions), and plan lighting renewals accordingly, is one way to deliver better results.

The Institution of Lighting Professionals recommends that local authorities classify environmental zones with appropriate lighting levels for each. A similar approach could usefully be applied to the SRN.

HE is making use of LEDs in the Yorkshire & Humber region to address CO₂ targets but this approach has benefits for light pollution also. The LED lights installed on the M62 near Huddersfield and Halifax and the M621 near Leeds can be monitored and controlled remotely.

Lighting of signs and gantries need no longer be on 24/7, with more sophisticated timing and motion sensitive technology now available, and potential to incentivise its use by reducing energy costs.
5.2 Emergency Refuge Areas

Smart motorways with all lanes running also have emergency refuge areas (ERAs). Due to concerns about their visibility to motorists, HE is now experimenting with bright orange ERAs. This is eye-catchingly visible but less than ideal for roads that aim to be in harmony with the landscape.

In the short term there may be potential to screen the ERAs better from the surrounding countryside. In the longer term, improved in-vehicle information may reduce the need for such high visibility.

One option could be to use a combination of roadside marker signs, similar to those used to count down to emergency telephones, with low level lighting for night time, similar to that used for emergency routes in buildings and aeroplanes. Using solar powered lighting would be a low carbon, low maintenance option.

Another option would be to use gabions (wire structures containing rocks) to designate ERAs. The DMRB advises that large areas of gabions can be visually obtrusive and should not be used, but does note the potential for gabions using local stone to add to the environmental quality of a road.8

Using gabions to mark ERAs could serve the dual function of forming a functional boundary and providing a distinctive yet appropriate marker for road users.

Recommendations:
- Expand use of cantilever signs instead of gantries at sensitive locations
- Make wider use of different paint and coating colours on cantilevers and gantries
- Conduct periodic reviews of gantries and signs as part of corridor plans
- HE should keep the requirements for gantry-mounted equipment under review
- HE should develop a hierarchy of sites for light sensitivity
- Greater use should be made of timed and motion sensitive lighting, and smaller lighting columns
- RIS2 should extend the use of LED lighting across the network
- There should be an enhanced budget for sign audit, repair and replacement.

Recommendations:
- HE should continue to explore the best way to make ERAs visible while reducing their adverse visual impact
- The Design Panel could be asked to help develop guidance on ERA design.

---

Table 1: Environmental Zones

<table>
<thead>
<tr>
<th>Zone</th>
<th>Surrounding</th>
<th>Lighting environment</th>
<th>Examples</th>
</tr>
</thead>
</table>
| E0   | Protected   | Dark                 | ● UNESCO Starlight Reserves  
       |              |                      | ● IDA Dark Sky Parks & Reserves |
| E1   | Natural     | Intrinsically dark   | ● National Parks  
       |              |                      | ● Areas of Outstanding Natural Beauty etc. |
| E2   | Rural       | Low district brightness | ● Village or relatively dark outer suburban locations |
| E3   | Suburban    | Medium district brightness | ● Small town centres or suburban locations |
| E4   | Urban       | High district brightness | ● Town/city centres with high levels of night time activity |

---

Case Study: Hardwick Hall, M1

Hardwick Hall is an Elizabethan stately home in Derbyshire between Chesterfield and Mansfield. Set in historic parkland, this prominent National Trust property overlooks the M1, which runs along the park boundary.

In an interesting pilot, the gantries on this section of the M1 have been replaced with cantilevered signs, which are coated brown to merge better into the surrounding woodland, as are the lighting columns. This has reduced the visual impact of the hardware with no loss of functionality.

This is an easily scalable approach that could be rolled out to sensitive locations across the network. Highways England could develop a palette of colour schemes for use in different locations and by specifying these in contracts would ensure these can be delivered as part of business as usual.

**Recommendations:**
- Expand use of cantilever signs instead of gantries at sensitive locations
- Make wider use of different paint and coating colours on cantilevers and gantries
- Conduct periodic reviews of gantries and signs as part of corridor plans
- HE should keep the requirements for gantry-mounted equipment under review
- HE should develop a hierarchy of sites for light sensitivity
- Greater use should be made of timed and motion sensitive lighting, and smaller lighting columns
- RIS2 should extend the use of LED lighting across the network
- There should be an enhanced budget for sign audit, repair and replacement.

---

Table 1: Environmental Zones

<table>
<thead>
<tr>
<th>Zone</th>
<th>Surrounding</th>
<th>Lighting environment</th>
<th>Examples</th>
</tr>
</thead>
</table>
| E0   | Protected   | Dark                 | ● UNESCO Starlight Reserves  
       |              |                      | ● IDA Dark Sky Parks & Reserves |
| E1   | Natural     | Intrinsically dark   | ● National Parks  
       |              |                      | ● Areas of Outstanding Natural Beauty etc. |
| E2   | Rural       | Low district brightness | ● Village or relatively dark outer suburban locations |
| E3   | Suburban    | Medium district brightness | ● Small town centres or suburban locations |
| E4   | Urban       | High district brightness | ● Town/city centres with high levels of night time activity |

---

Case Study: Hardwick Hall, M1

Hardwick Hall is an Elizabethan stately home in Derbyshire between Chesterfield and Mansfield. Set in historic parkland, this prominent National Trust property overlooks the M1, which runs along the park boundary.

In an interesting pilot, the gantries on this section of the M1 have been replaced with cantilevered signs, which are coated brown to merge better into the surrounding woodland, as are the lighting columns. This has reduced the visual impact of the hardware with no loss of functionality.

This is an easily scalable approach that could be rolled out to sensitive locations across the network. Highways England could develop a palette of colour schemes for use in different locations and by specifying these in contracts would ensure these can be delivered as part of business as usual.

**Recommendations:**
- Expand use of cantilever signs instead of gantries at sensitive locations
- Make wider use of different paint and coating colours on cantilevers and gantries
- Conduct periodic reviews of gantries and signs as part of corridor plans
- HE should keep the requirements for gantry-mounted equipment under review
- HE should develop a hierarchy of sites for light sensitivity
- Greater use should be made of timed and motion sensitive lighting, and smaller lighting columns
- RIS2 should extend the use of LED lighting across the network
- There should be an enhanced budget for sign audit, repair and replacement.

---

Table 1: Environmental Zones

<table>
<thead>
<tr>
<th>Zone</th>
<th>Surrounding</th>
<th>Lighting environment</th>
<th>Examples</th>
</tr>
</thead>
</table>
| E0   | Protected   | Dark                 | ● UNESCO Starlight Reserves  
       |              |                      | ● IDA Dark Sky Parks & Reserves |
| E1   | Natural     | Intrinsically dark   | ● National Parks  
       |              |                      | ● Areas of Outstanding Natural Beauty etc. |
| E2   | Rural       | Low district brightness | ● Village or relatively dark outer suburban locations |
| E3   | Suburban    | Medium district brightness | ● Small town centres or suburban locations |
| E4   | Urban       | High district brightness | ● Town/city centres with high levels of night time activity |

---

Case Study: Hardwick Hall, M1

Hardwick Hall is an Elizabethan stately home in Derbyshire between Chesterfield and Mansfield. Set in historic parkland, this prominent National Trust property overlooks the M1, which runs along the park boundary.

In an interesting pilot, the gantries on this section of the M1 have been replaced with cantilevered signs, which are coated brown to merge better into the surrounding woodland, as are the lighting columns. This has reduced the visual impact of the hardware with no loss of functionality.

This is an easily scalable approach that could be rolled out to sensitive locations across the network. Highways England could develop a palette of colour schemes for use in different locations and by specifying these in contracts would ensure these can be delivered as part of business as usual.

**Recommendations:**
- Expand use of cantilever signs instead of gantries at sensitive locations
- Make wider use of different paint and coating colours on cantilevers and gantries
- Conduct periodic reviews of gantries and signs as part of corridor plans
- HE should keep the requirements for gantry-mounted equipment under review
- HE should develop a hierarchy of sites for light sensitivity
- Greater use should be made of timed and motion sensitive lighting, and smaller lighting columns
- RIS2 should extend the use of LED lighting across the network
- There should be an enhanced budget for sign audit, repair and replacement.

---

Table 1: Environmental Zones

<table>
<thead>
<tr>
<th>Zone</th>
<th>Surrounding</th>
<th>Lighting environment</th>
<th>Examples</th>
</tr>
</thead>
</table>
| E0   | Protected   | Dark                 | ● UNESCO Starlight Reserves  
       |              |                      | ● IDA Dark Sky Parks & Reserves |
| E1   | Natural     | Intrinsically dark   | ● National Parks  
       |              |                      | ● Areas of Outstanding Natural Beauty etc. |
| E2   | Rural       | Low district brightness | ● Village or relatively dark outer suburban locations |
| E3   | Suburban    | Medium district brightness | ● Small town centres or suburban locations |
| E4   | Urban       | High district brightness | ● Town/city centres with high levels of night time activity |

---

Case Study: Hardwick Hall, M1

Hardwick Hall is an Elizabethan stately home in Derbyshire between Chesterfield and Mansfield. Set in historic parkland, this prominent National Trust property overlooks the M1, which runs along the park boundary.

In an interesting pilot, the gantries on this section of the M1 have been replaced with cantilevered signs, which are coated brown to merge better into the surrounding woodland, as are the lighting columns. This has reduced the visual impact of the hardware with no loss of functionality.

This is an easily scalable approach that could be rolled out to sensitive locations across the network. Highways England could develop a palette of colour schemes for use in different locations and by specifying these in contracts would ensure these can be delivered as part of business as usual.

**Recommendations:**
- Expand use of cantilever signs instead of gantries at sensitive locations
- Make wider use of different paint and coating colours on cantilevers and gantries
- Conduct periodic reviews of gantries and signs as part of corridor plans
- HE should keep the requirements for gantry-mounted equipment under review
- HE should develop a hierarchy of sites for light sensitivity
- Greater use should be made of timed and motion sensitive lighting, and smaller lighting columns
- RIS2 should extend the use of LED lighting across the network
- There should be an enhanced budget for sign audit, repair and replacement.
5.3 Medians and barriers

The design of medians and barriers will be driven primarily by safety requirements. However there is potential to enhance these both aesthetically and in terms of biodiversity.

Concrete crash barriers are highly effective, relatively low cost and easy to deploy but have severe adverse impacts on biodiversity. Because concrete barriers are impermeable they will reinforce the fragmentation of natural habitats. By adding to the hard landscape they will also increase the pressure on drainage systems. There is also evidence that rigid barriers and barrier posts may increase the safety risk to motorcyclists and other vulnerable road users involved in collisions.9

Without undermining their structural integrity and adding undue cost, there is potential to explore how concrete barriers could be designed to offer gaps for wildlife and permit drainage while still deploying a safety function.

The DMRB guidance on environmental barriers (volume 10.5) says 'The challenge for the road engineer is to produce a barrier whose appearance harmonises with its surroundings, thereby minimising the visual intrusion caused by the barrier itself whilst maximising the reduction in visual intrusion arising from the road and its traffic'.

There is potential to make more use of local, place-sensitive materials and natural materials. For example, use of stone or wood, and tree planting either in lieu of or to soften the appearance of hard engineered structures. This does require considered and consistent application to be successful.

As a minimum, suitable paint colours could be used on metal crash barriers and stone facing where appropriate on concrete structures. This also reduces potential for staining from water run-off and exhaust fumes.

**Recommendations**

- HE should develop or commission a crash barrier design that allows permeability while meeting safety requirements
- HE should develop a palette of materials and paint colours for use in different locations, with advice from the Design Panel.

**Case study: A23 West Sussex**

Stone cladding was used to improve the appearance of a double bridge carrying the A23 over Staplefield Road/Slaugham Road near Handcross. At local road level this has produced a successful and sympathetic design. However, at the upper level, the cladding was not continued on the adjacent SRN barriers, so the opportunity to create a consistent sense of place was lost.

**Case study: Route 161, Maryland**

The Maryland State Highway authority upgraded a section of Route 161 through a protected natural area around Deer Creek in Harford County. The award-winning design used natural stone masonry to construct and clad bridges and barriers, and painted metal elements in ‘Park Service Brown’ to blend into the surroundings.

5.4 Bridges

**Design standards for bridges**

Major bridges are landmarks and should be treated as such in design terms, with the same standards for design quality, innovation and response to setting as any other landmark building. The award-winning Millau viaduct was the result of an international design competition, held under the auspices of the French Ministry of Works.

Developing design standards for minor bridges, which address form as well as function, is also important. There is a wide variety of minor roads, footpaths and bridle paths crossing the SRN, with bridges of varying design quality.

As more urban extensions and logistics sites develop close to the SRN, the number of new bridges is increasing. Often these have a dedicated funding pot from developers’ budgets. It makes sense to set design standards for them early in RIS2 to minimise the risk of a new generation of ugly infrastructure.

Railway bridges over roads have particular functional requirements, but simple maintenance can have a major positive impact on their visual impact.

**Green bridges**

Green bridges have potential to transform the road environment in landscape terms as well as addressing habitat severance. They create safe passage for wildlife of all sizes, as well as improving or maintaining connections for local residents, leisure visitors and farm vehicles.

Green bridges have become the norm in road design across Europe, including significant projects in Poland, Austria (Carpathians), Germany (where wildlife overpasses have been built over 32 motorways, with 28 more in the planning or construction stage), Belgium and the Netherlands: yet these successful structures have been rare in the UK.

Designing green features into new bridges from the outset can help to make them multi-functional with benefits for people, wildlife and landscapes, and importantly need not be costly.

The Landscape Institute has produced guidance on the design construction and management of green bridges. They advise that maintenance of green bridges need not be onerous: for example, scrub and hedgerow management every three to five years and tree coppicing every five to ten years depending on the
species used. Responsibility for ongoing maintenance should be agreed from the project outset. There is also potential for green bridge maintenance to be undertaken by landowners or even Friends Groups, rather than by HE.

To date most work on green bridges has been as part of new road schemes; however there is growing interest in retrofitting green bridges to existing roads, and retrofitting green features to existing bridges. There is also potential to combine green features with recladding bridges and other structures in more context-sensitive materials such as local stone.

There are proposals being developed for a green bridge over the existing A38 at Haldon Hill, Devon, to reconnect two parts of the Haldon Forest to protect motorists and wildlife from the frequent collisions with deer.

The HE environment fund has begun to commission work looking at retrofitting green features to existing ‘grey’ bridges. For example approaches used on green roofs and green walls, where planting is added to hard structures, may be transferable to bridges.

The application of green walls and roofs has become much more widespread as the installation and maintenance technology has developed, and they are now a mainstream feature in good infrastructure design. For example, the Crossrail project in London uses green roofs and wildflower planted mounds to cover head houses and screen access shafts.

**Recommendations:**
- HE should develop a ‘how to’ guide for new green bridges and for green bridge retrofit with support from the Design Panel
- Green bridge guidance should be included in the forthcoming revision of the DMRB
- Improving the appearance of existing bridges and underpasses should be integral to maintenance programmes
- The environment fund should be used to pump prime the greening of new and existing bridges at priority locations, including match funding landowner contributions.

**Case study: A21 Lamberhurst land bridge**
When the A21 Lamberhurst bypass was built, a green bridge was constructed to keep the link across the National Trust’s Scotney Castle site that would otherwise have been severed by the road. The bridge also protected the appearance of the Weald of Kent AONB and provided a safe corridor for protected dormice.

**Case study: Cutty Sark Bridge, A8 Coatbridge**
Network Rail Scotland refurbished the Cutty Sark rail bridge over the A8 Glasgow to Edinburgh road at Bargeddie near Coatbridge. In addition to essential maintenance works, the project saw the bridge repainted with cluttering signs removed.

Where green features are not an option, there is still potential to transform the appearance of existing bridges and underpasses for the better while reducing future maintenance costs.

**Case study: HS2 design standards for bridges**
The HS2 Design Panel encouraged HS2 Ltd to draw up a specimen bridge parapet design to act as a design quality benchmark for bridges across the project. As part of this they are exploring the potential for transparent parapets to reduce visual impact, and for off-site construction to cut costs and reduce delays from bridge works.

**Case study: A556 Knutsford to Bowdon**
The A556 Knutsford to Bowdon link road opened in March 2017. The scheme included Highways England’s first green bridge. This was built with a conventional concrete deck: the contractors then added a water retention and drainage system to support tree planting.

This is a lightweight modular geo-composite product which is cut to fit the surface profile of the bridge. The same technology could be used to retrofit existing concrete bridges.

**Case study: Pennington footbridge, Sefton**
When replacing a footbridge over the Leeds-Liverpool Canal in Bootle, Sefton Council commissioned a wooden bridge to be attractive as well as durable. The new footbridge has won architectural awards and contributed to the wider regeneration of the area.
5.5 Tunnels

The rail network, which demands much more level topography than the road network, shows the potential of tunnels both to provide navigable routes through the landscape, and also to minimise the visual impact of major infrastructure.

Road tunnels are a common solution across Europe, enabling routes to navigate barriers while providing landscape and environmental benefits. Other examples include the Madrid Calle 60 project, where a section of the city’s existing outer ring road was sunk in a tunnel, creating a new park area alongside the Manzanares river. Road tunnels are a less common feature of the HE network, but examples like Hindhead show their potential.

Case study: Hindhead tunnel

The Hindhead Tunnel was created to reroute the A3 trunk road bypassing Hindhead. In consultation with the National Trust and other stakeholders, a longer tunnel was agreed which reunited two sections of the Hindhead Commons AONB. In addition to the biodiversity benefits, the project enhanced the landscape and provided safe access for walking and cycling.

Hindhead also demonstrates the wider benefits to the network of such interventions. It has addressed a bottleneck and is now a test bed for new technology on detecting safety incidents within tunnels via the HE innovation fund.

Recommendations:

- HE should develop a ‘how to’ guide for cut and cover retrofit with support from the Design Panel
- RIS2 should identify some locations for pilot use of cut and cover tunnels to retrofit existing roads
- The HE environment fund could be used to pump prime action at priority locations, including matching funding landowner contributions.

5.6 Sustainable drainage systems

Using sustainable drainage systems has benefits for road users as well as the wider environment. Efficient drainage reduces danger and disruption from water on the highway, while the long-term benefits of a resilient road surface will reduce damage from severe weather or flooding.

Sustainable drainage can be supported by specifying appropriate road surfacing, combined with noise reducing materials. Drainage systems alongside roads can use natural drainage as an alternative to hard engineering solutions such as concrete storm drains. Using natural drainage makes the road more attractive, reduces its impact on natural habitats and can be highly effective in providing drainage.

SUDS (Sustainable Urban Drainage Systems) encourage storage and natural drainage of rainfall close to source: design features include permeable surfacing, grass swales, soakaways and wetlands.

CIRIA has developed a tool BeST (Benefits of SUDS Tool), which evaluates a wide range of benefits, based on the overall drainage system performance. The tool helps quantify and monetise each benefit based on Ecosystem Services (ESS) and Triple Bottom Line (TBL) criteria. This approach could be more widely used by HE in assessing the value of green infrastructure solutions.

New tunnels are an expensive option and only suitable on a small number of major schemes. Tunnel portals are significant structures for which design standards could usefully be developed where new tunnels are proposed.

A programme of selective tunnelling or cut and cover schemes, focusing on existing roads could become a central and very positive element of the RIS2 programme. In natural landscapes they restore the skyline and reuniate habitats. In urban / suburban areas, they help address pollution, reduce severance, and free up land for leisure use or for redevelopment, in turn reducing pressure on greenfield and green belt sites.

Transport for London has explored the potential for placing sections of London’s arterial road network in cut and cover tunnels to reduce the impact on air and noise pollution on the A13 at Barking and the A3 at Tolworth. RIS2 could usefully prioritise locations on the SRN where this treatment could suitable.

Recommendations:

- Greater use should be made of green infrastructure solutions
- HE should incorporate best practice on sustainable drainage in the revised DMRB
- HE should develop a ‘how to’ guide for cut and cover retrofit with support from the Design Panel
- RIS2 should identify some locations for pilot use of cut and cover tunnels to retrofit existing roads
- The HE environment fund could be used to pump prime action at priority locations, including matching funding landowner contributions.

Case study: Los Angeles bioswales

Los Angeles highways had a significant challenge in managing storm water run-off. The conventional approach was to construct a large scale network of concrete storm drains at considerable financial and environmental cost.

Instead, the city adopted a Low Impact Development approach, based on these principles:

- Beneficial use of rainwater and urban runoff
- Water quality improvement
- Rainwater harvesting
- Reduction of offsite runoff
- Increased groundwater recharge
- Reduction of erosion and hydrologic impacts downstream
- Enhancement of recreational and aesthetic values.

A series of bioswales (shallow ditches with vegetation) and tree pits were planted, which have provided effective drainage through sustainable interventions.

Case study: Friesland recycled surfacing

In the Netherlands, the standard road surfacing is open-graded asphalt friction course (OGFC), which is porous and water permeable but requires higher volumes of bitumen to bind the aggregate. A new project in Friesland, developed in partnership with the University of Utrecht, is retrieving cellulose from waste paper in the drainage system. The material is sterilised, bleached and dried, and then used in combination with bitumen to provide a cost-effective OGFC product.

New technologies are also being developed which convert the material into a cost effective OGFC product.
5.7 Surfacing and barriers to address noise

Traditional approaches to noise have focused on meeting noise standards for people living near major roads, using a mixture of acoustic barriers and double glazing for the homes most affected. This approach has limited benefit for road users and is arguably less cost effective than tackling the problem at source.

Where barriers are needed, they are often visually unattractive and can spoil open views or add to the sense of urban enclosure. Lines of highly visible noise barriers can detract from landscape and sense of place. Better schemes would incorporate or hide barriers within the landscape (for example, by use of natural bunds) or screened by planting. Good design can transform barriers from being intrusive and make them a positive feature of the road landscape.

Examples of best practice from Denmark and Germany include the use of brown coloured concrete, steel grids supporting climbing plants, or wooden cladding, to reduce the visual impact of noise barriers.

Bunds and earth banks used to screen from the noise or visual impact of roads can also be used to create habitats for migrating birds, reptiles and invertebrates as well as bases for native tree and wild flower planting.

Even if barriers screen noise from the neighbouring areas, noisy road surfacing remains a nuisance for road users. Transport Focus has identified surface quality, including noise, as a major concern of SRN users. Their latest research confirms that road users prefer asphalt roads to concrete ones, partly because they are quieter to drive on.

There is exciting work on use of recycled materials in surfacing and potential to deploy these green solutions to also deliver lower noise. HE innovation funding could be used to explore delivering low noise surfacing and sustainable drainage systems with the latest technology to reduce the duration and impact of road works.

Where barriers are needed, using trees to create or screen noise barriers would improve their appearance while reducing noise nuisance. The US Department of Transport advises that planting buffer strips with trees and shrubs that are dense enough to be visually opaque, can provide a noise reduction of three to five dBa per 100 feet. The Woodland Trust recommends using evergreens for year round effectiveness, and advises that planting trees on top of an earth bund is particularly effective.

5.8 Expressways

A new type of road design, the expressway, is due to be rolled out in RIS2. Expressways are upgrades of trunk roads to deliver mile a minute journeys on modern dual carriageways, with grade separated junctions, smart technology and exclusion of non-motorised users. The expressway programme is likely to focus on single carriageway trunk roads.

Many of the roads identified to become expressways are in the most sensitive locations precisely because upgrades such as dualling have been problematic at these sites. Grade-separated junctions, wider roads and parallel routes for non-motorised users will transform the appearance of these roads. Therefore getting expressway design guidance right will have a significant impact.

The Design Panel has already been asked to comment on draft expressway design guidance. The Panel should consider adopting the DMRB expressway Interim Advice Note as a strategic design project.

The Design Panel could identify and adopt a specific early expressway scheme (where an existing A road is being upgraded to an expressway) to serve as a best practice pilot for future expressways and demonstrate the cumulative impact of the different interventions proposed in this report.

Recommendations:
- The Design Panel should take a lead on developing expressway design guidance
- The Design Panel should adopt an early expressway project as a model design.

5.9 Motorway service areas

Motorway service areas (MSAs) introduce significant clusters of buildings into otherwise undeveloped sites. There is significant regulation and guidance on spacing, signs and range of facilities but little or none on design.

Transport Focus reports that roadside facilities are an integral part of road users’ experience and have called on HE to play an active role in facilitating high-quality service area provision.

In the most sensitive areas, including the Cotswolds and the Lake District, new or upgraded motorway services areas have been built using local materials and low-profile buildings.

These high standards could be rolled out across the SRN. A simple improvement would be to adopt the French practice of including landscaped picnic sites, with appropriate tree planting, at all service areas. Where there are wider environmental benefits, this type of improvement could be supported by the designated funds.

In the USA, the National Park Service’s Mission 66 project set design standards for rest area buildings in protected landscapes. The design palette included low roof lines, use of natural materials and soft landscaping. There is a wealth of good practice on green buildings – including green roofs and walls and rainwater recycling - and greener car parking design that could be usefully applied to MSAs and potentially to park & ride sites and other interchanges on the SRN.
In addition to MSAs, Transport Focus has researched the widely variable quality of rest area and refreshment provision in lay-bys and rest areas on the trunk road network. These range from roadside restaurants to food vans.

HE is developing new expressway designs to upgrade trunk roads across the SRN. As part of the expressway design standards in development, there could usefully be set minimum design specifications for rest areas and lay-bys. One possibly transferable example of best practice is from town centre management schemes, where standard shells have been used to harmonise the appearance of independent street trading outlets.

Recommendations:
- The DMRB review should include design standards for MSAs, developed with advice from the Design Panel
- Design standards should include location-sensitive design and green building features
- There should be greater use of landscaping and natural features at MSAs
- HE should encourage a minimum design standard for mobile vendors on the trunk road network.

Case study: Gloucester Services, M5
Located in the Cotswolds AONB on the M5, this service area uses local stone, natural wood and maximum use of daylight to provide an attractive interior under a low profile green roof. The design, by Glenn Howells Associates, has won multiple awards for architecture and sustainability.

Case study: Hopwood Services, M42 Worcestershire
The Hopwood Services on the M42 near J2 Alvechurch are adjacent to a nature reserve and the river Arrow. The site has incorporated a drainage ditch into landscaped grounds with decorative water features, natural water features and a sustainable drainage system, combining improved amenity for customers with a more environmentally sensitive design.

6. A supportive policy environment

The Strategic Road Network is the backbone of the nation’s road system, connecting to major roads, and directly or indirectly affecting communities in every part of the country. Just as the SRN does not exist in isolation, nor do the policies that affect it.

Wider policy areas have the potential to affect the delivery of more beautiful roads.
- Strategic infrastructure corridors: these bring together agencies, funding and policy priorities from transport, housing, employment and can have a distinctive design character
- Land use planning at local level: the location and design of new developments has an impact on the SRN that is beyond HE’s control
- Procurement policies including any changes post Brexit: the specification, resourcing and monitoring of contracts is critical to delivering a better road network.

6.1 Corridor planning: respecting local design character

Improving the visual impact of HE roads cannot be delivered on the SRN in isolation: major roads should be considered as part of a network and part of a place.

Corridors could have different design standards reflecting the character of the surrounding area and these could be applied to motorway service areas as well as to other highways infrastructure on that corridor.

Local planning authorities often have well-developed design policies for their areas, for example the Chichester design protocol includes the policy that ‘Highways design should conserve and enhance the quality and character of the built and natural environment including our rural settlements’, while the guidance in Hull advises that ‘Highway Lighting should form an integral part of the street layouts, respect the existing lighting, locational characteristics, such as Conservation Areas, and consider long term maintenance issues.’

The same principle applies to local Biodiversity Action Plans, where HE should be engaged as a key stakeholder in locations where the SRN has a significant presence. HE should take these local policies into account as well as national design standards when upgrading the network.

6.2 Wider land-use planning policy

In some places, targets for house building and economic growth are increasing pressure on the SRN with knock-on implications for the adjacent environment (more pollution, congestion and pressure for more lanes).

Local plans do not always give due regard to the SRN and the need for maintenance and amelioration from increased use. As part of RIS2 delivery, HE could engage with local authorities along the SRN in their local plan process as well as on individual schemes.

6.3 A fresh approach to maintenance

Maintenance has emerged as a key issue among HE officers and contractors and one seen by them as a challenge when considering roads and the environment.

The challenge of maintaining infrastructure with revenue budgets under pressure is well-known and is a particular issue on the wider major roads network.

Capital funding for new or improved infrastructure is not always matched by revenue for its ongoing management and future maintenance.
Case study: Lincolnshire Wildlife Trust new approach to road verge management

Lincolnshire Wildlife Trust has been working since last October with Peakhill Associates, HE Area 12 and AOne+.

Based on an initial study undertaken by Yorkshire Wildlife Trust, an assessment of biodiversity opportunity and highway verge management guidance was proposed with focus on three stretches of the SRN in South Yorkshire and North Lincolnshire (M18, M62 and M180). Habitat management recommendations for biodiversity net gain were put forward which addressed woodland and scrub (with opportunities to build habitat connectivity for Willow Tit), roadside drainage ditches and diversification of acid and neutral grassland. By incorporating this guidance into its bid for RIS2 money, HE Area 12 has since won support from both the environment and innovation designated funds.

In addition, Peakhill Associates provided a viability assessment of the potential to undertake biomass harvesting of non-woody material from the targeted motorway verges in order to supply local anaerobic digestion facilities for electricity generation. As part of this project biomass harvesting is now planned between junctions 1 and 3 on both sides of the M180. A procurement exercise is planned in November which will involve assessment of forage harvesting equipment potentially suitable for the SRN. Using the products of good verge and roadside woodland maintenance to sell on as feedstock for biomass is a positive example of the circular economy.

This is even more of an issue for green infrastructure, which includes soft and living elements that require regular or seasonal maintenance, unlike hard infrastructure whose maintenance is less time sensitive.

Anxiety about maintenance costs combined with less familiar maintenance regimes can have a chilling effect on incorporating green measures and innovative design features into schemes, even if in practice they would prove no less costly to maintain than more conventional hard engineering. There are examples from new urban extensions where high design standards including street trees, SUDS, etc. has led to local highways authorities refusing to adopt the roads due to feared maintenance costs.

Research from the Linear Infrastructure Network has demonstrated that green infrastructure brings not only environmental benefits, but also long term cost savings and resilience benefits. Traditional maintenance regimes, for example of verges, may be highly damaging to the roadside environment without in practice being more cost effective in the long term. Green infrastructure features, such as sustainable drainage, tree barriers and natural chalk walls, require less maintenance than man-made structures.

There is a role for constructive challenge within HE of assumptions that green infrastructure is necessarily higher maintenance: and an opportunity to share best practice on sustainable maintenance regimes. This could be facilitated by including environmental representation on HE Technical Project Boards. To support this, the legacy strand of HE’s environment fund could be more effectively harnessed to act as a sinking fund for future maintenance of funded schemes.

The Forestry Commission has produced evidence on benefits of green infrastructure, including how tree planting can stabilise banks and verges, screen noise and pollution, and improve biodiversity. Their work shows that tree planting reduces maintenance costs, can generate income from biomass and other by-products, and enhance the landscape for road users and the surrounding community.

There is an opportunity to develop the case studies from this report and existing best practice into design guidance to inform regular HE operations.

Applying natural capital accounting approaches or payments for ecosystems services could help incentivise more environmentally friendly maintenance regimes and demonstrate their value for money. Adopting the resource rent approach to lifetime costing of schemes would make green infrastructure an affordable option for future maintenance.

Finally, maintenance activities can themselves make a negative contribution to the road environment. Harnessing the latest good practice in road maintenance, such as on site recycling of materials (as in the case study in section 6.7 above) or use of robotics, can reduce the site footprint and duration of works.

Transport Focus reports that improving the maintenance of major roads, while also reducing disruption and delay from road works, are high priorities for RIS2 from road users. Transport Focus advises that it is vital that RIS2 provides sufficient maintenance and capital renewal funding to keep the SRN in good order, with a dedicated renewals backlog fund.

Allocating more resource within RIS2 to maintenance is appropriate: it would deliver an improved road environment and also reflect the priorities of road users who will be funding RIS2 through Vehicle Excise Duty.

Case study: M11 Theydon Bois

The Woodland Trust acquired land alongside the M11 at Theydon Bois. With the Forestry Commission support, the Trust planted over 50,000 trees and installed 2.5 kilometres of recreational trails, creating a multi-functional greenspace for local people to enjoy. The project has improved access and will make a significant contribution to biodiversity and moderating the impact of climate change in the area.
6.4 Location and alignment

The focus of this report is on the potential for environmental retrofit of existing roads rather than on new road design. However, it is important to acknowledge that getting the right alignment for new roads is crucial to managing their impact on the landscape.

This is an area where the Design Panel could have more of a role. Currently, their input is much later in scheme development, typically on the same timescale as public consultation on preferred route options. Involving the Design Panel or working groups commissioned by the panel to look at the landscape implications at option identification stage would be a positive move.

Given the lasting impact of highways infrastructure on the landscape, the Design Panel could contribute to the POPE reviews of road schemes and identify priority locations for landscape enhancement.

Recommendations:
- Increase the proportion of RIS2 budgets allocated for network maintenance as opposed to new schemes
- Allow a proportion of capital budgets to endow a fund for future scheme maintenance
- Consider natural capital accounting or ecosystems services payments, such as the resource rent approach to make green infrastructure an affordable option for future maintenance
- Provide guidance, possibly via the Design Panel, on high quality, low maintenance interventions
- Harness expertise of natural environment sector in sharing knowledge to demystify maintenance of green infrastructure and incorporate it into business as usual
- Champion use of new technology to reduce footprint and timescale of road works
- For new roads, the Design Panel should be invited to advise on the landscape implications of routes at option identification stage
- For existing roads, the Design Panel should be involved in POPE reviews to identify priority locations for landscape enhancement.

Annex: terms of reference and call for evidence

Roads and the environment: putting an innovative approach at the heart of RIS2 – call for evidence

Campbell for Better Transport has been commissioned by the Rees Jeffreys Road Fund to produce a report on the strategic road network and the environment.

The project

The brief is to offer constructive proposals on how Highways England could best deliver on its environmental obligations to promote a sustainable road network with improved environmental outcomes, in particular through the disbursement of the £300 million designated fund for the environment it holds as part of the Road Investment Strategy settlement.

We anticipate our work will build on existing work with other NGOs on the potential for improved environmental outcomes in RIS2; draw on examples of best practice from the UK and abroad; and complement the important work of the HE Design Panel and the advisory group on HE’s designated funds to which we already contribute. It follows that we are particularly focused on the scope for environmentally-focused schemes, rather than the design of forthcoming capacity-focused projects, though both are clearly important.

Call for evidence

We are particularly interested in evidence on:
- The damaging impact on the environment (habitats, landscape, noise) of the trunk road network (motorways and A roads) as it has developed to date, and the scope for environmental retrofitting projects in the course of RIS2
- Your perspectives on the RIS1 processes, specifically the allocation of the designated funds on environment and air pollution, and the impact of the design panel and your recommendations for implementing improved processes in RIS2
- What good would look like, generally in road design, including examples of international best practice
- What other processes and/or funding opportunities exist or should be created in RIS2 to help deliver HE’s environmental vision.

This project reflects the mission of the Rees Jeffreys Road Fund to promote better and safer roads in terms of design, engineering and aesthetics and is aimed at helping shape the next Road Investment Strategy for the years 2021-2025.
Acknowledgements

This report was produced by Campaign for Better Transport for the Trustees of the Rees Jeffreys Road Fund. The report authors are Bridget Fox and Andrew Allen, with design by Fran J. Bath.

We are grateful for the insights, advice and examples from our steering group:

Sue Percy (CIHT)
Steve Gooding (representing the Rees Jeffreys Road Fund)
John Stewart (Vice Chair, Campaign for Better Transport)
Rachel Hackett (The Wildlife Trusts)

We are also grateful to a wide range of contributors, who assisted with evidence for this report, a number of Highways England officers and contractors, and others including:

Anne Robinson, Friends of the Peak District
Chris Todd, Campaign for Better Transport
Clare Warburton, Natural England
Daniel Carey-Dawes, CPRE
Isabell Buschel, Transport & Environment
Jason Torrance, Sustrans
Jim Herbert, ABG Ltd
Mark Robinson, CPRE
Mark Schofield, Lincolnshire Wildlife Trust
Phil Belden, Sussex Wildlife Trust
Ralph Smyth, member HE Design Panel
Roger Geffen, Cycling UK
Ruth Bradshaw, Campaign for National Parks
Simon Benfield, Ramboll Ltd
Steve Ankers, South Downs Society
Zsolt Schuller, consultant

Their expertise was invaluable in informing our work; the interpretation and conclusions are the responsibility of the report authors alone.

References

2. CIRIA: Biodiversity Net Gain, Good practice principles for development (2016)
3. Plantlife: Good verge guide (June 2016)
7. ILP: Guidance Notes for the Reduction of Obtrusive Light GN01 (2011)
8. DMRB Volume 10 Environmental Design and Management Section 2 Improving Existing Roads (2001)
10. CIRIA: New tool assesses the benefits of SuDS (2016)
12. Transport Focus: Take a break Road users’ views about roadside facilities July 2016

Image credits

Page 6-9: A27, Ruth Chapple and Chris Todd
Page 9: Stanmer Park aerial view, Dominic Alves, Flickr
Page 14: Leeds by night, sa_teo, Flickr
Page 27: M6 Cumbria, rockabilly_girl, Flickr
Page 27: Landbridge, natuurbrugzandpoort.nl
Page 30: Hardwick Hall, Sunchild57 Photography, Flickr
Page 32: A293 bridge, George Redgrave, Flickr
Page 32: Deer Creek bridge, Nicolas Raymond www.freestock.ca
Page 33: Onesund bridge, News Åresund, Johan Weissman
Page 38: Noise barrier A12, Nelis Zevensloot, Flickr
Page 39: Stockport M60, John Parkinson, Flickr
Page 40: Gloucester motorway service station, Laramie, Flickr
Page 40: Florida Interstate 10 rest area, MJRGoblin, Flickr
Page 43: Wildflower verge, ORR
Campaign for Better Transport’s vision is a country where communities have affordable transport that improves quality of life and protects the environment. Achieving our vision requires substantial changes to UK transport policy which we aim to achieve by providing well-researched, practical solutions that gain support from both decision-makers and the public.

info@bettertransport.org.uk.
Phone: 020 7566 6480

www.bettertransport.org.uk
www.facebook.com/bettertransport
www.twitter.com/cbtransport

16 Waterside, 44-48 Wharf Road, London N1 7UX

Registered Charity 1101929. Company limited by guarantee, registered in England and Wales: 4943428

March 2018